Comparative study on computer-implemented inventions/software-related inventions

Report 2021 | EPO and JPO

Europäisches Patentamt
European Patent Office
Office européen des brevets

JPO

This report was prepared
by the EPO and the JPO

Published by
European Patent Office
Munich
Germany

Design
European Patent Office

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I. Summary

The EPO and the JPO are long-standing partners whose co-operation efforts aim at improving the levels of service they provide to their stakeholders. In recent years, there have been rapid technological advances in the area of "computer-implemented inventions" (CII) which have resulted in significant increases in CII-related patent applications. This represents a challenge to patent offices and applicants alike, as does the increasing penetration of CII technologies into other areas of innovation. A further challenge for applicants is the fact that different patent offices operate under different legal codes and therefore may apply different approaches to the examination of CII patent applications.

In response to these challenges, the EPO and the JPO have jointly conducted a comparative study on software-related inventions,[1] with the aim of providing applicants and practitioners insights into their respective examination practices. The results presented illustrate the similarities and differences of approach taken and provide guidance on how to draft valid patent claims that fulfil the patentability requirements at both offices.

In general, patents on software-related inventions are granted at both the EPO and the JPO. The laws applied by the EPO and the JPO impose broadly similar substantive requirements on obtaining patents for software-related inventions. In both jurisdictions, two requirements are of particular relevance. First, a software-related invention must be a statutory "invention" in the sense that it is not excluded/ineligible subject-matter. Second, the claimed subject-matter must be novel and involve an inventive step (i.e. is non-obvious). These legal requirements are assessed by the two offices with overlapping yet different sets of criteria, leading to overall outcomes which are not always aligned. (The reader is referred in particular to section III, "Comparative study of example cases".) In relation to sufficiency of disclosure (EPO) and the enablement requirement (JPO), both the legal requirements and the outcomes of the sample cases are comparable.

With this clear and detailed comparison of the EPO's and the JPO's CII practices, both offices aim to promote innovation for the benefit of their stakeholders and provide their users with a better understanding of what to expect when filing CII-related patent applications. It is hoped that a better and clearer understanding of EPO and JPO legal requirements and working practices will support applicants in drafting their applications with a higher degree of confidence of achieving a positive outcome.

The results of this comparative study have only indicative meaning and are not legally binding on the two offices.

[1] The EPO uses the term "computer-implemented invention", whereas the JPO uses the term "software-related invention". The latter term is used throughout this study

Glossary

EPO	European Patent Office
EPC	European Patent Convention
EPC rules	Implementing Regulations to the Convention on the Grant of European Patents
EPO Guidelines	Guidelines for Examination in the European Patent Office
JPO	Japan Patent Office
JPA	(Japan) Patent Act
JP Guidelines	Examination Guidelines for Patent and Utility Model in Japan
JPHB	Examination Handbook for Patent and Utility Model in Japan
Software-related invention	Computer-implemented invention (EPO) Computer software-related invention (JPO)

II. Comparative study of laws, regulations and guidelines

A. The requirement of "technical character"[2]/ technical effect

1. Non-excluded/eligible subject matter

The European Patent Convention (EPC) does not define what is meant by "invention", but Article 52(2) EPC[3] does contain a non-exhaustive list of things which are excluded from patentability and therefore not regarded as "inventions", if claimed as such (see also Article 52(3) EPC[4] and EPO Guidelines G-II, 3). The items on this list are all either abstract (e.g. mental acts or mathematical methods) and/or non-technical (e.g. aesthetic creations or presentations of information). An "invention" within the meaning of Article 52 EPC[5] must therefore be of both a concrete and a technical character. It may be in any field of technology.

At the JPO, Article 2(1) JPA[6] defines an eligible "invention" as "the highly advanced creation of technical ideas utilizing the laws of nature". An invention which does not comply with this definition is rejected based on the main paragraph of Article 29(1) JPA.[7] It is also noted that Article 2(3) JPA[8] stipulates that a computer program, etc., is included in the term "a product", which is one of the categories of inventions.

With regard to the JPO, a list of ineligible subject-matter not falling under the statutory definition of an "invention" is described in JP Guidelines, Part III, Chap. 1, 2.1.

In addition to this subject-matter, specific subject-matter regarding software-related inventions is not regarded as a statutory "invention"; it is described in JPHB, Annex B, Chap. 1. Details are described in the section below headed "3. Approach for assessing whether a software-related invention is a statutory 'invention' or excluded/ineligible subject-matter".

The table below summarises the type of subject-matter relevant for the assessment of software-related inventions excluded from patentability at both patent offices.

EPO	JPO
Under Article 52(2) and (3) EPC, the following are not regarded as "inventions" if claimed as such: (a) discoveries, scientific theories and mathematical methods; (b) aesthetic creations; (c) schemes, rules and methods for performing mental acts, playing games or doing business, and programs for computers; (d) presentations of information.	In JP Guidelines, Part III, Chap. 1, 2.1, the following are not regarded as "inventions": (a) a law of nature as such (b) mere discoveries and not creations (c) those contrary to a law of nature (d) those in which a law of nature is not utilised, e.g. (i) any laws other than a law of nature (e.g. economic laws), (ii) arbitrary arrangements (e.g. a rule for playing a game as such), (iii) mathematical formula, (iv) mental activities of humans or (v) those utilising only (i) to (iv) (e.g. methods for doing business as such) (e) those not regarded as technical ideas, e.g. personal skill, mere presentation of information or mere aesthetic creations (f) those for which it is clearly impossible to solve the problem to be solved by any means presented in a claim

[2] The EPO regards claimed subject-matter as having technical character if it involves the use of any technical means. Therefore, any computer implemented method has technical character and is thus not excluded from patentability under Article 52(2) and (3) EPC. In the context of assessing inventive step, a feature is said to contribute to the technical character of an invention if it contributes to producing a technical effect.

[3] Article 52(2) EPC:
The following in particular shall not be regarded as inventions within the meaning of paragraph 1:
(a) discoveries, scientific theories and mathematical methods; (b) aesthetic creations; (c) schemes, rules and methods for performing mental acts, playing games or doing business, and programs for computers; (d) presentations of information.

[4] Article 52(3) EPC:
Paragraph 2 shall exclude the patentability of the subject-matter or activities referred to therein only to the extent to which a European patent application or European patent relates to such subject-matter or activities as such.

[5] Article 52(1) EPC:
European patents shall be granted for any inventions, in all fields of technology, provided that they are new, involve an inventive step and are susceptible of industrial application.
For paragraphs 2, 3 of Article 52 EPC, see footnotes 3 and 4.

[6] Article 2(1) JPA:
"Invention" in this Act means the highly advanced creation of technical ideas utilizing the laws of nature.

[7] Article 29(1) JPA:
An inventor of an invention that is industrially applicable may be entitled to obtain a patent for the said invention, except for the following: ...

[8] Article 2(3) JPA:
"Working" of an invention in this Act means the following acts:
(i) in the case of an invention of a product (including a computer program, etc., the same shall apply hereinafter), producing, using, assigning, etc. (assigning and leasing and, in the case where the product is a computer program, etc., including providing through an electric telecommunication line, the same shall apply hereinafter), exporting or importing, or offering for assignment, etc. (including displaying for the purpose of assignment, etc., the same shall apply hereinafter) thereof;
(ii) in the case of an invention of a process, the use thereof; and
(iii) in the case of an invention of a process for producing a product, in addition to the action as provided in the preceding item, acts of using, assigning, etc., exporting or importing, or offering for assignment, etc. the product produced by the process.

2. Claim formats

Under the EPC, the claims must be supported by the description and define the extent of patent protection sought in a clear and concise manner (Article 84 EPC). With regard to software-related inventions, different claim formulations are acceptable at the EPO in cases where all method steps can be fully implemented by generic data processing means. The following is a (non-exhaustive) list of examples of claim formulations (see EPO Guidelines F-IV, 3.9.1):

(1) Method claim:[9]
A computer-implemented method comprising steps A, B ...
A method carried out by a computer comprising steps A, B ...

(2) Apparatus/device/system claim:
A data processing apparatus/device/system comprising means for carrying out [the steps of] the method of claim 1.
A data processing apparatus/device/system comprising means for carrying out step A, means for carrying out step B ...
A data processing apparatus/device/system comprising a processor adapted to/configured to perform [the steps of] the method of claim 1.

(3) Computer program/product claim:
A computer program [product] comprising instructions which, when the program is executed by a computer, cause the computer to carry out [the steps of] the method of claim 1.
A computer program [product] comprising instructions which, when the program is executed by a computer, cause the computer to carry out steps A, B ...

(4) Computer-readable storage medium/data carrier claim:
A computer-readable [storage] medium comprising instructions which, when executed by a computer, cause the computer to carry out [the steps of] the method of claim 1.
A computer-readable [storage] medium comprising instructions which, when executed by a computer, cause the computer to carry out steps A, B ...
A computer-readable data carrier having stored thereon the computer program [product] of claim 3.
A data carrier signal carrying the computer program [product] of claim 3.

[9] With regard to the EPO, see EPO Guidelines F-IV, 3.9.1, which stipulate: "A computer-implemented method ..." or "A method carried out by a computer ...". "A medium storing a data structure ..." or "an electromagnetic carrier wave carrying a data structure ..." are also acceptable claim formats. The patentability of such computer data structures is examined according to EPO Guidelines G II, 3.6.3. These sections of the Guidelines reflect pertinent case law of the EPO boards of appeal.

As the claim set as a whole must be concise, Rule 43(2) EPC[10] requires that there should only be one independent claim per category in the claim set. The claim categories are: product, process, apparatus and use.

This requirement is further described in EPO Guidelines F-IV, 3.2. For software-related inventions, claims to a computer program or a computer program product are allowed alongside corresponding product claims, for example to an apparatus, a device or a system (see part F-IV, 3.2 (iv)).

At the JPO, the statement in the claims must comply with each of the following requirements: an invention for which a patent is sought is disclosed in the description; an invention for which a patent is sought is clear; the statement for each claim is concise (Article 36(6)(i), (ii) and (iii) JPA).

At the JPO, an applicant can state the following as an "invention of a method" or an "invention of a product" in the claims (JPHB, Annex B, Chap. 1, 1.2.1.1):[11]

(1) Invention of a method
When a software-related invention can be expressed as a series of processes or operations which are connected in terms of a time series, more specifically, as "steps", an applicant can state the software-related invention as an "invention of a method" (including an "invention of producing a product") in the claims, by identifying the "steps".

[10] Rule 43(2) EPC:
Without prejudice to Article 82, a European patent application may contain more than one independent claim in the same category (product, process, apparatus or use) only if the subject-matter of the application involves one of the following:
(a) a plurality of interrelated products,
(b) different uses of a product or apparatus,
(c) alternative solutions to a particular problem, where it is inappropriate to cover these alternatives by a single claim.

[11] With regard to the JPO, see JPHB, Annex B, Chap. 1, 1.2.1.2. If it is clear in consideration of description and drawings as well as the common general knowledge as of the filing that the claimed invention is a "program" even though the claimed subject-matter is any word other than the "program" (for example, "module", "library", "neural network", "support vector machine" or "model") the claimed invention is handled as the "program."
When the claim is a computer program product, the claimed invention is handled as what it
means, as long as it is clear in consideration of the detailed description of the invention that it means any of (a) - (c) below. If this is not the case, the claimed invention will breach clarity requirement, because the scope of the invention is unclear.
(a) A "program" itself
(b) A "recording medium in which a program is recorded"
(c) A system into which a program is read, such as a "computer system into which a program is read"

(2) Invention of a product
(i) A "program" that identifies a plurality of functions a computer serves.
Example 1: A program for causing a computer to execute a step A, a step B, a step C ...
Example 2: A program for causing a computer to function as means A, means B, means C ...
Example 3: A program for causing a computer to implement a function A, a function B, a function C ...
(ii) "Structured data" or a "data structure" in which information processing to be performed by a computer is prescribed by a structure of data.
Example 4: Structured data including a data element A, a data element B, a data element C ...
Example 5: A data structure including a data element A, a data element B, a data element C ...
(iii) A computer-readable recording medium which records the "program" in (i) above or the "structured data" in (ii) above.
Example 6: A computer-readable recording medium which records a program for causing a computer to execute a process A, a process B, a process C ...
Example 7: A computer-readable recording medium which records a program for causing a computer to function as means A, means B, means C ...
Example 8: A computer-readable recording medium which records a program for causing a computer to implement a function A, a function B, a function C ...
Example 9: A computer-readable recording medium which records structured data including a data element A, a data element B, a data element C ...

At the JPO, "Structured data ..." or "A data structure ..." is an acceptable claim format regardless of whether the structured data or a data structure is stored on a medium or not.

The JPO does not have the similar requirement of only one independent claim per category (as defined in Rule 43(2) EPC). More than one independent claim is acceptable as long as those claims meet the requirement of unity.

3. Approach for assessing whether a software-related invention is a statutory "invention" or excluded/ineligible subject-matter

The EPO's approach for assessing whether a software-related invention is an "invention" within the meaning of Article 52(1), (2) and (3) EPC is described in EPO Guidelines G-II, 3, and its subsections.

Inventions involving programs for computers can be protected in different forms of a "computer-implemented invention", an expression intended to cover claims which involve computers, computer networks or other programmable apparatus whereby prima facie one or more of the features of the claimed invention are realised by means of a program or programs.

The basic patentability considerations in respect of claims for computer programs are in principle the same as for other subject-matter. While "programs for computers" are included among the items listed in Article 52(2) EPC, if the claimed subject-matter has a technical character it is not excluded from patentability by the provisions of Article 52(2) and (3) EPC.

Technical character should be assessed without regard to the prior art, i.e. the features which contribute to the technical character may be known already (see T 1173/97, confirmed by G 3/08). Features of the computer program may potentially lend technical character to the claimed subject-matter, as explained below.

A claim to a computer program is not excluded from patentability if it is capable of bringing about, when running on a computer, a further technical effect going beyond the "normal" physical interactions between the program (software) and the computer (hardware) on which it is run (T 1173/97 and G 3/08). The normal physical effects of the execution of a program, e.g. electrical currents, are not in themselves sufficient to lend a computer program technical character, and a further technical effect is needed.

A further technical effect which lends technical character to a computer program may be found e.g. in the control of an industrial process or in the internal functioning of the computer itself or its interfaces under the influence of the program and could, for example, affect the efficiency or security of a process, the management of computer resources required or the rate of data transfer in a communication link. A computer program implementing a method that itself makes a technical contribution would also be considered to be capable of bringing about a further technical effect when it is run on a computer.

The activity of programming, in the sense of writing code, is an intellectual, non-technical activity and therefore does not contribute to the production of a technical effect (see G 3/08 and T 1539/09).

Claims directed to a computer-implemented method, a computer-readable storage medium or a device cannot be objected to under Article 52(2) and (3) EPC as any method involving the use of technical means (e.g. a computer) and any technical means itself (e.g. a computer or a computer-readable storage medium) have technical character and thus represent inventions within the meaning of Article 52(1) EPC (T 258/03, T 424/03, G 3/08). This approach has also been called the "any-technical-means approach". Such claims should not contain program listings but should define all the features which assure the patentability of the process which the program is intended to carry out when it is run. Short excerpts from programs might be accepted in the description.

If claimed subject-matter relating to a computer program does not have technical character, it should be rejected under Article 52(2) and (3) EPC. If the subject-matter passes this test for technicality, the examiner should then proceed to the questions of novelty and inventive step.

Following the any-technical-means approach, a storage medium has technical character. Therefore, claims directed to the following can be considered to be inventions within the meaning of Article 52(1) EPC:

— computer-implemented methods using data formats and/or structures;
— data formats and/or structures embodied on a medium or on an electromagnetic carrier wave.

Technical effects associated with data structures or formats when using said data structure or format during the operation of a computer system could give rise to, for example: efficient data processing, efficient data storage, enhanced security. On the other hand, features merely describing data collections on a logical level do not provide a technical effect, even if such a description might involve a particular modelling of the described data.

Therefore, when assessing inventive step of physically embodied data structures and data formats, their nature needs to be assessed. Functional data is used to control a device which processes the data and inherently comprises technical features of the controlled device. Cognitive data, on the other hand, is only relevant to human users. Functional data may form the basis of a technical effect whereas cognitive data does not.

In order to confirm that a claim is directed to functional data EPO examiners check whether the claimed data structures inherently comprise or reflect the technical features of the system or the steps of a corresponding method which forms the basis of the technical effect.

The JPO's approach for assessing whether a software-related invention is an "invention" within the meaning of Article 2(1) JPA is described in JPHB, Annex B, Chap. 1, 2.1.

There are up to two steps for making that assessment: firstly the determination based on JP Guidelines, Part III, Chap. 1, and secondly the determination according to the "idea based on the standpoint of software" in JPHB, Annex B, Chap. 1, 2.1.

First of all, the examiner reviews whether or not the claimed software-related invention is a "creation of a technical idea utilizing a law of nature", based on JP Guidelines, Part III, Chap. 1.

The examiner does not review according to the "idea based on the standpoint of software" if a determination on whether or not the claimed software-related invention is a "creation of a technical idea utilizing a law of nature" is made based on JP Guidelines, Part III, Chap. 1. In other words, during this review, the examiner does not need to take into consideration whether the claimed invention is in fact implemented in software.

If not, the examiner makes a determination according to the "idea based on the standpoint of software".

When making the determinations, the examiner reviews whether or not the claimed invention as a whole is a "creation of a technical idea utilizing a law of nature", irrespective of some recitations in the claims.

Regarding the determination based on JP Guidelines, Part III, Chap. 1, claimed inventions utilising a law of nature as a whole and being considered a "creation of a technical idea utilizing a law of nature" irrespective of whether computer software is utilised (e.g. (i) or (ii) shown below) constitute a statutory "invention" without being examined from the viewpoint of computer software.

Computer software for causing a computer to execute a method which is a "creation of a technical idea utilizing a law of nature" and thus constitutes a statutory "invention", or a computer or system for executing such method, is normally a creation of a technical idea utilising a law of nature as a whole, and thus it constitutes a statutory "invention".

(i) Those concretely performing control of an apparatus (e.g. rice cooker, washing machine, engine, hard disk drive, chemical reaction apparatus, nucleic acid amplifier) or processing with respect to the control.

(ii) Those concretely performing information processing based on the technical properties, such as the physical, chemical, biological or electric properties, of an object (e.g. rotation rate of engine, rolling temperature, relation between gene sequence and expression of a trait in a living body, physical or chemical relation of bound substances).

When the claimed software-related invention falls under any type of subject-matter not corresponding to a statutory "invention" in JP Guidelines, Part III, Chap. 1, 2.1, the claimed invention is not a "creation of a technical idea utilizing a law of nature".

Regarding the determination according to the "idea based on the standpoint of software", if it is not determined based on JP Guidelines, Part III, Chap. 1, whether or not the claimed software-related invention falls under the "creation of a technical idea utilizing a law of nature", the examiner makes a determination on the requirements of "creation of a technical idea utilizing a law of nature" depending on whether or not "information processing by software is specifically implemented by using hardware resources" in a software-related invention – that is to say, whether or not a specific information processor or an operation method thereof depending on the intended use is constructed through co-operation of software and hardware resources.

With this specific determination approach, the examiner may determine based on the statement of the claims whether or not specific calculation or processing of information depending on the intended use is implemented by specific means or procedures on which software and hardware resources co-operate.

With regard to the handling of structured data or a data structure, the examiner determines whether structured data or a data structure is equivalent to a program, that is, whether structured data or a data structure has characteristics similar to a program in that the structure of the data specifies the processing of the computer. Structured data or a data structure is determined to be software when it is equivalent to a program. Even if it is data having structure or a data structure, it is not determined to be software when it is not equivalent to a program.

Regarding whether structured data (including a computer-readable recording medium on which structured data is recorded) or a data structure falls under a "creation of a technical idea utilizing a law of nature" or not, the examiner makes a determination according to the approach mentioned above.

When a determination on the eligibility of structured data or a data structure according to the "idea based on the standpoint of software" is made, the examiner makes a determination on the requirements of a "creation of a technical idea utilizing a law of nature" according to whether or not information processing specified by a structure that data has is specifically implemented by using hardware resources.

B Novelty

At the EPO, an invention can only be patented if it is new. An invention is considered to be new if it does not form part of the state of the art. The first step in deciding whether an invention is new is to define the prior art, the relevant part of that art, and the content of that relevant art. The next is to compare the invention with the prior art thus defined and see whether the invention differs from it. If it does, the invention is novel. Further details on the examination of novelty can be found in EPO Guidelines G-VI.

At the JPO, the matter which the examiner should take into consideration in examining novelty or inventive step concerning a claimed invention of a sub-combination including an expression specifying the invention of the sub-combination by elements of another sub-combination is described in JP Guidelines, Part III, Chap. 2, 4.

The examiner should consider elements relevant to "another sub-combination" stated in the claim and not ignore them in specifying the claimed invention. The examiner should also understand the role which the elements have in specifying the sub-combination invention in terms of its shape, structure, constituent elements, composition, operation, function, property, characteristics, method (an act or action), use, etc. (hereinafter referred to as "a structure, function, etc.") when they specify the claimed sub-combination invention. In this regard, the examiner takes into account the statements of the description and drawings as well as common general knowledge at the time of filing.

In cases where an element relevant to "another sub-combination" has a role in specifying a structure, function, etc. of the claimed sub-combination invention, the examiner understands that the claimed sub-combination invention has such a structure, function, etc. If there is a difference between a sub-combination invention and cited prior art, the examiner determines that the sub-combination invention involves novelty.

In cases where an element relevant to "another sub-combination" specifies only "another sub-combination" and does not specify a structure, function, etc. of the claimed sub-combination invention at all, the examiner specifies the invention on the premise that the element relevant to "another sub-combination" does not have a role in specifying the claimed sub-combination invention. If no differences exist except for a difference between elements relevant to "another sub-combination" and elements specifying cited prior art in view of a description or an expression, there are no differences between the claimed sub-combination invention and the cited prior art in terms of structure, function, etc. Therefore, the examiner determines that the sub-combination invention does not involve novelty.

C Inventive step

With regard to the EPO, the treatment of claims comprising technical and non-technical features is described in EPO Guidelines G-VII, 5.4.

It is legitimate to have a mix of technical and non-technical features appearing in a claim, as is often the case with computer-implemented inventions. The non-technical features may even form a major part of the claimed subject-matter. However, in the light of Article 52(1), (2) and (3) EPC, the presence of an inventive step under Article 56 EPC requires a non-obvious technical solution to a technical problem (T 641/00, T 1784/06).

When assessing the inventive step of such a mixed-type invention, all those features which contribute to the technical character of the invention are taken into account. These also include the features which, when taken in isolation, are non-technical, but do, in the context of the invention, contribute to producing a technical effect serving a technical purpose, thereby contributing to the technical character of the invention. However, features which do not contribute to the technical character of the invention cannot support the presence of an inventive step (T 641/00). Such a situation may arise, for instance, if a feature contributes only to the solution of a non-technical problem, e.g. a problem in a field excluded from patentability.

To this end, non-technical features of a claim can be included in the problem formulation as a constraint to be met to the extent that these non-technical features do not interact with the claim's technical features. This has the desirable effect that the non-technical aspects of the claimed invention, which generally relate to non-patentable desiderata, ideas and concepts and belong to the phase preceding any invention, are automatically cut out of the assessment of inventive step and cannot be mistaken for technical features positively contributing to inventive step.

The steps below outline the application of the problem-solution approach to mixed-type inventions:

(i) The features which contribute to the technical character of the invention are determined on the basis of the technical effects achieved in the context of the invention.

(ii) Based on the features contributing to the technical character of the invention identified in step (i), the closest prior art is selected.

(iii) The differences from the closest prior art and the claimed invention are identified. The technical effect(s) of these differences, in the context of the claim as a whole, is (are) determined in order to identify from these differences the features which make a technical contribution and those which do not.

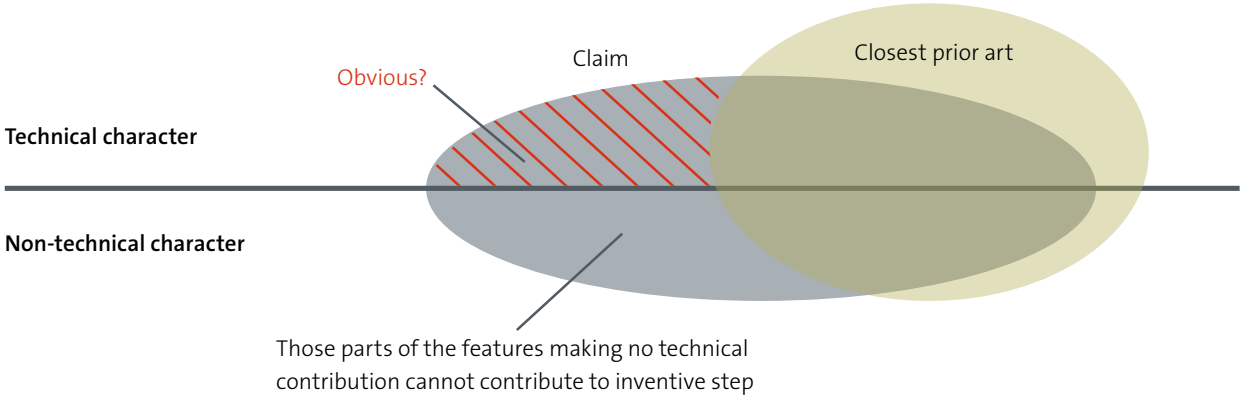
(a) If there are no differences (not even a non-technical difference), an objection under Article 54 EPC is raised.

(b) If the differences do not make any technical contribution, an objection under Article 56 EPC is raised. The reasoning for the objection should be that the subject-matter of a claim cannot be inventive if there is no technical contribution to the prior art.

(c) If the differences include features making a technical contribution, the following applies:
- The objective technical problem is formulated on the basis of the technical effect(s) achieved by these features. In addition, if the differences include features making no technical contribution, these features, or any non-technical effect achieved by the invention, may be used in the formulation of the objective technical problem as part of what is "given" to the skilled person, in particular as a constraint that has to be met.
- If the claimed technical solution to the objective technical problem is obvious to the person skilled in the art, a lack-of-inventive-step objection is raised (Article 56 EPC).
- If the claimed technical solution to the objective technical problem is deemed not obvious to the person skilled in the art, the claim is considered to be inventive.

Figure 1:

Summary of how inventive step for mixed-type inventions is assessed at the EPO



The determination of the features contributing to the technical character of the invention should be performed for all claim features in step (i) (T 172/03, T 154/04). However, in practice, due to the complexity of this task, the examiner can normally perform the determination in step (i) on a prima facie basis only and perform a complete and detailed analysis at the beginning of step (iii). In step (iii), the technical effects achieved by the differences over the selected closest prior art are determined. The extent to which the differences contribute to the technical character of the invention is analysed in relation to these technical effects. This analysis, limited to the differences, can be performed in a more detailed manner and on a more concrete basis than the one performed in step (i). It may therefore reveal that some features considered in step (i) prima facie to not contribute to the technical character of the invention do, on closer inspection, make such a contribution. The reverse situation is also possible. In such cases, the selection of the closest prior art in step (ii) might need to be revised.

When performing the analysis in steps (i) and (iii) above, care should be taken to avoid missing any features that might contribute to the technical character of the claimed subject-matter, in particular if the examiner reproduces their understanding of the subject-matter of the claim in their own words during the analysis (T 756/06).

At the JPO, specifying the claimed invention is described in JP Guidelines, Part III, Chap. 2, 3.

The examiner specifies the claimed invention and the prior art, and then compares both in determining novelty and inventive step.

Regarding the claimed invention, the examiner specifies it based on the claim. The examiner takes the description, drawings and common general knowledge at the time of filing into consideration in interpreting the meanings of words in the claims. The examiner should always consider the matter or terms described in the claims and should not ignore them.

When specifying a software-related invention, it is appropriate to understand an invention as a whole, while it is not appropriate to specify it by dividing it into arbitrary arrangements or the like and systemisation methods, as described in JPHB, Annex B, Chap. 1, 2.2.1.

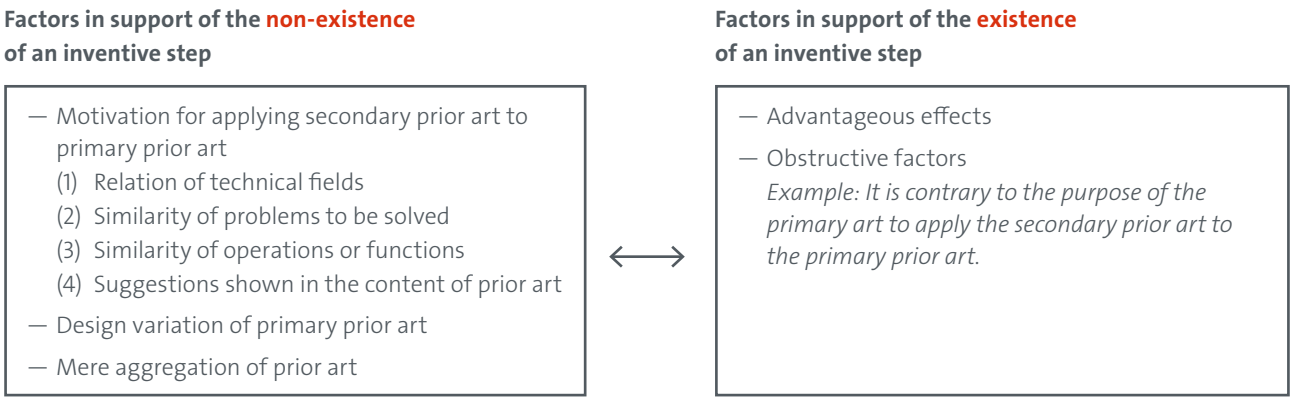
At the JPO, during the inventive step assessment, no distinction is made between features which are technical and those which are not.

The JPO examiner selects the prior art most suitable for the reasoning (hereinafter referred to as "the primary prior art") and determines whether it is possible to reason that a person skilled in the art would easily arrive at the claimed invention from the primary prior art by following steps (1) to (4) below. The examiner should not regard the combination of two or more independent pieces of prior art as the primary prior art.

(1) The examiner determines whether or not the reasoning is possible based on the various factors in support of the non-existence of an inventive step for the differences between the claimed invention and the primary prior art by adopting other pieces of prior art (hereinafter referred to as "secondary prior art") or considering common general knowledge.

(2) If the examiner determines that the reasoning is impossible based on the above step (1), the examiner determines that the claimed invention involves an inventive step.

Figure 2:
Main factors for reasoning



(3) If the examiner determines that the reasoning is possible based on the above step (1), the examiner determines whether the reasoning is possible by comprehensively assessing various factors which include factors in support of the existence of an inventive step.

(4) If the examiner determines that the reasoning is impossible based on the above step (3), the examiner determines that the claimed invention involves an inventive step. If the examiner determines that the reasoning is possible based on the above step (3), the examiner determines that the claimed invention does not involve an inventive step (JP Guidelines, Part III, Chap. 2, 3).

D. Sufficiency of disclosure/enablement requirement

The patent system is designed to promote protection of inventions by granting an exclusive right, i.e. a patent right, under predefined conditions for a predefined period of time to a person who has developed and disclosed novel technology or techniques, and to give third parties an opportunity to gain access to the inventions by virtue of disclosure of technical details of the inventions. As such, the requirement that an invention be sufficiently disclosed is one of the fundamental underpinnings of the patent system.

At the EPO, a patent application must disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Article 83 EPC). In essence, the invention as claimed must be reproducible on the basis of the technical information disclosed in the patent specification. As pointed out in EPO Guidelines F-III, 12, if a claimed invention lacks reproducibility, this may become relevant under either the requirement of sufficiency of disclosure or the requirement of inventive step, as the case may be. In particular, if an invention lacks reproducibility because the desired technical effect as expressed in the claim is not achieved, this results in a lack of sufficient disclosure, which has to be objected to under Article 83 EPC. Otherwise, i.e. if the effect is not expressed in the claim but is part of the problem to be solved, there is a problem of inventive step (see G 1/03, Reasons 2.5.2, T 1079/08, T 1319/10, T 5/06 and T 380/05).

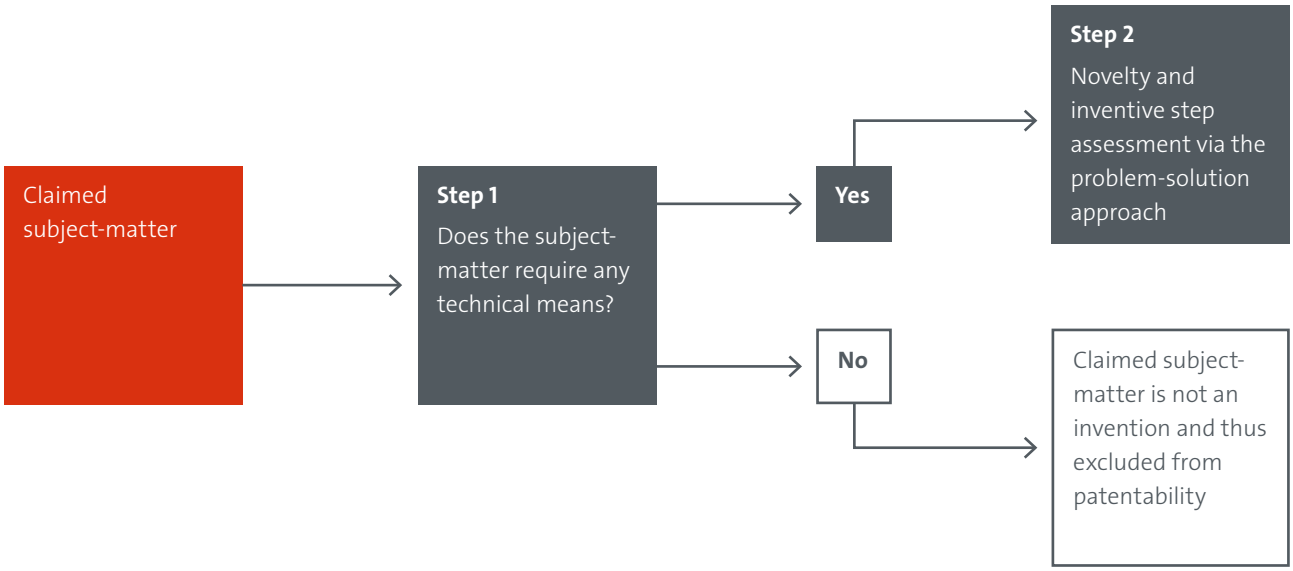
At the JPO, Article 36(4) JPA provides a very similar requirement to that of Article 83 EPC and stipulates that the description serves as the technical document which gives third parties an opportunity to gain access to the invention. If the statement in the description is not clear, its role of disclosure is undermined, which in turn undermines the very purpose of the patent system. In particular, Article 36(4)(i) JPA requires that "the statement shall be clear and sufficient in such a manner as to enable any person ordinarily skilled in the art to which the invention pertains to work the invention". This requirement is known at the JPO as "the enablement requirement".

E. General trend of examination results

In general, patents on software-related inventions are granted at both the EPO and the JPO. The laws applied by the EPO and JPO impose similar substantive requirements on obtaining patents for software-related inventions. In both jurisdictions, two requirements are of particular relevance, namely, on the one hand, the requirement that the claimed invention must not be excluded from patentability, and, on the other hand, the requirement that claimed subject-matter

Figure 3:

Summary of the two-step approach for assessment of software-related applications at the EPO



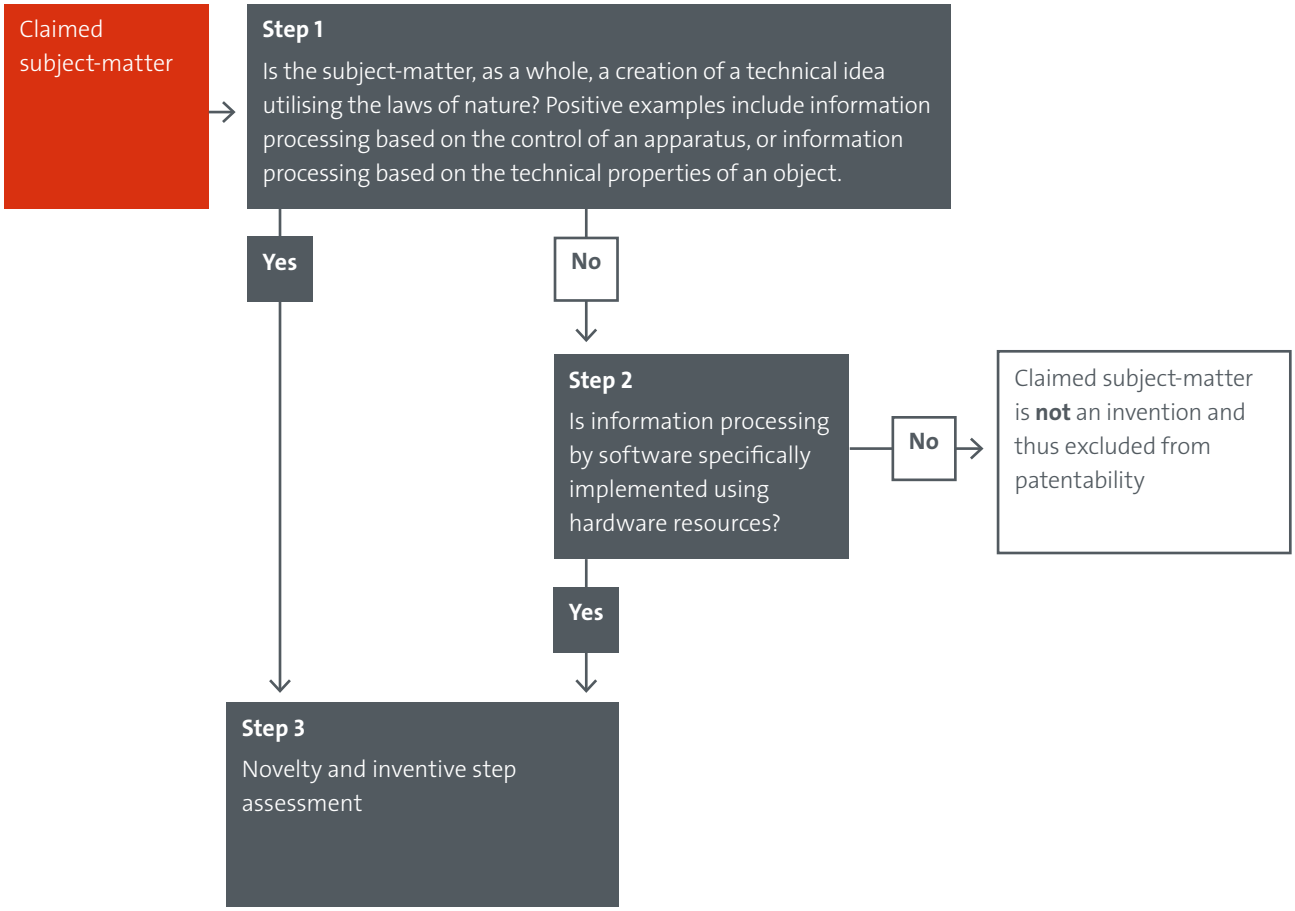
must be novel and non-obvious (or, equivalently, involve an inventive step).

The EPC does not give a positive definition of the terms "invention" and "technical". However, having technical character is an implicit requirement for an invention within the meaning of Article 52 EPC. Since an invention is only excluded from patentability if it relates to the items listed in Article 52(2) EPC as such, the EPO follows the any-technical-means approach; accordingly, a claim to a method that requires the presence of technical means to be carried out, such as a computer, a network or the internet, is regarded as an "invention" within the meaning of Article 52 EPC. Similarly, devices are always regarded as "inventions" since, by definition, they require some form of technical means. A claim to a computer program only avoids an exclusion from patentability through the presence of a further technical effect, i.e. an effect that goes beyond the normal physical interactions between computer hardware and software, such as circulation of electrical currents in the computer. As a further consequence of the any-technical-means approach, claimed subject-matter is an invention irrespective of whether a claim comprises, in addition to any technical means, also non-technical features. The any-technical-means approach is the result of evolving case law of the EPO's boards of appeal which has, over time, shifted the boundaries of what is regarded as excluded subject-matter. In effect, these shifts have made it easier to define an invention which is patentable in principle, and not excluded under Article 52(2) and (3) EPC. However, at the same time it has become harder to meet the requirement of non-obviousness, because the criteria that used to play a role when assessing whether claimed subject-matter is excluded from patentability now play a role when assessing inventive step. (The overall patentability threshold for software-related inventions has remained substantially the same.) Figure 3 illustrates the two-step approach of the EPO, the first step applying the any-technical-means approach to evaluate whether claimed subject-matter is excluded from patentability, and the second step applying the problem-solution approach to evaluate novelty and inventive step.

In contrast to the EPC, which lacks any definition for the term "invention", Article 2(1) JPA defines an invention as "the highly advanced creation of technical ideas utilizing the laws of nature". As a result of this positive definition of what constitutes an invention, the manner in which the JPO examines whether a claimed software-related invention satisfies this definition is more involved than at the EPO. In essence, whether a software-related invention is an invention within the meaning of Article 2(1) JPA is assessed by having regard to the claim as a whole.

For the first step, if the claim as a whole does not use laws of nature, it is not an invention within the meaning of Article 2(1) JPA. This is similar to the any-technical-means approach of the EPO. Also, since the claim is considered as a whole, it may be that a claim is not eligible, i.e. excluded from patentability, even if some parts of the claimed subject-matter could be said to utilise laws of nature. However, the claimed subject-matter can be considered a creation of a technical idea utilising the laws of nature, for example, when an invention processes information based on either the control of another apparatus

Figure 4:
Approach of the JPO



or based on the technical properties of an object. If the outcome of this first step is positive, the JPO continues with the examination of novelty and inventive step.

For the second step, even if an invention is not acknowledged at the first step, there can still be an invention within the meaning of Article 2(1) JPA. Here, the JPO performs a review of the claimed subject-matter according to the "idea based on the standpoint of software". This criterion is satisfied as long as the claim defines "information processing by software that is specifically implemented using hardware" resources. In other words, computing or processing of specific information must be implemented with specific means or a specific process whereby software and hardware co-operate in accordance with the purpose of use of the claimed subject-matter. Where it cannot be clearly identified which hardware resource specifically enables information processing for each function mentioned in the claim, the JPO could assess that the claimed subject-matter does not constitute an invention, even if the claim explicitly refers to hardware resources, such as a "computer". If the outcome of the second step is positive, the JPO continues with the examination of novelty and inventive step.

When the two approaches of the EPO and the JPO are compared, it is evident that defining an invention within the meaning of Article 52 EPC is significantly easier than defining an invention within the meaning of Article 2(1) JPA. However, the more lenient criteria of the EPO for establishing an invention are followed by more stringent criteria when examining the requirements of inventive step by means of the problem-solution approach for mixed-type inventions, i.e. inventions comprising both technical and non-technical features (EPO Guidelines G-VII, 5.4).

The EPO's approach to inventive step only takes those features into account which contribute to the technical character of the invention. Hence, features which are non-tech-

nical when viewed in isolation, but do, in the context of the claimed invention, contribute to producing a technical effect serving a technical purpose, need to be considered. However, features making no technical contribution may be used in the formulation of the objective technical problem as part of what is "given" to the skilled person, in particular as a constraint that has to be met.

This approach has the effect that sometimes there is a finding of lack of inventive step in view of prior art which is no more than a simple general-purpose computer. Here, a typical example would be the straightforward implementation of a business method on a general-purpose computer. In this example, assuming the steps of the business method do not contribute to producing any technical effect, it is both permissible and adequate to use the business method, as it is claimed, in the problem formulation as part of the framework of the technical problem that is to be solved (as a constraint that has to be met). The reader is referred here to examples C-1 ("Supply Chain Management Method") and C-4 (on brokering offers and demands in the field of transporting freight).

Another particularly noteworthy example in this regard is case C-8 ("Training a neural network ('drop-out')"), which concerns a neural network device and addresses a typical problem encountered when training such a device. Here, the JPO acknowledges that a neural network device is an invention within the meaning of Article 2(1) JPA and also finds an inventive step. The EPO, on the other hand, considers neural networks to be of a non-technical, purely mathematical nature. As a consequence, an improved training method which addresses a non-technical problem cannot contribute to the claimed subject-matter's technical character, with the outcome that the EPO finds a lack of inventive step in view of a general-purpose computer as the prior art.

The JPO's approach considers the claim as a whole, no matter whether the features disclosed in the claims contribute to the technical character of the invention. In other words, the claimed subject-matter is not divided into technical and non-technical features for the purpose of assessing inventive step. Therefore, it would be unusual to start an inventive step objection from a general-purpose computer, even in the case of subject-matter that essentially relates to an automated business method.

In summary, the distinction made by the EPO between technical and non-technical features has the effect that the EPO considers a claimed invention to be obvious more easily than the JPO. This general observation concerning obviousness is well reflected by the conclusions drawn by the two offices with respect to the example cases.

In spite of the different approaches adopted by the EPO and the JPO, there are some notable parallels between the respective criteria applied by the two offices. As outlined above, when the JPO examines whether there is an invention within the meaning of Article 2(1) JPA, it assesses whether a software-related invention processes information based on either the control of an apparatus or the technical properties of an object. Similarly, at the EPO, information processing which is performed for a technical purpose makes a contribution to a claimed invention's technical character. An example is a mathematical method which is excluded from patentability when viewed in isolation, but which makes a technical contribution when applied for a technical purpose, such as speech recognition or the control of a technical device. Note that making such a contribution is only possible when the claim is functionally limited to the technical purpose. (See also EPO Guidelines G-II, 3.3, on mathematical methods and in particular the exemplary list of technical purposes given under the heading "Technical applications".)

In a similar manner to the second step of the JPO's approach, i.e. determining whether or not a specific information processor or an operation method thereof depending on the intended use is constructed through co-operation of software and hardware resources, the EPO recognises that features which are the result of technical implementation choices which go beyond merely automating non-technical method steps contribute to the technical character and thus have to be duly taken into account when assessing inventive step. In accordance with the JPO's approach, in principle, information processing by software needs to be specifically implemented in co-operation with hardware resources. However, the hardware resources do not have to be limited to any specific device or devices.

Another notable similarity between both offices is the fact that data structures are not excluded from patentability. At the EPO, only "functional data" can make a contribution to technical character and inventive step. In order to establish the presence of functional data, the examiner needs to check whether the data structure as claimed inherently comprises or reflects the technical features of the system or the steps of a corresponding method which forms the basis of the technical effect. For example, a record carrier for use in a picture retrieval system stores coded pictures together with a data structure defined in terms of line numbers and addresses which instruct the system how to decode and access the picture from the record carrier. This data structure is functional data defined in terms which inherently comprise the technical features of the picture retrieval system, namely the record carrier and a reading device for retrieving pictures therefrom in which the record carrier is operational. It thus

contributes to the technical character of the record carrier, whereas the cognitive content of the stored pictures (e.g. photograph of a person or landscape) does not. In addition, the data must have a physical embodiment, i.e. it must be embodied on a medium or as an electromagnetic carrier wave.

This approach is very similar to the JPO's treatment of "structured data". If the subject-matter is characterised only by the content of information presented, it is not acknowledged as an invention at the JPO. What is accepted as a software-related invention by the JPO is not data itself, but data which is structured in that it has characteristics which are similar to a computer program, i.e. the data specifies the processing performed by the computer. Unlike at the EPO, a "data structure" is an acceptable claim format regardless of whether the structured data or a data structure is stored on a medium or not.

In relation to sufficiency of disclosure (EPO) and the enablement requirement (JPO), both the legal requirements and the outcomes of the sample cases are comparable. In those cases where the claimed subject-matter concerns merely the automation of otherwise non-technical subject-matter, such as an automated business method, the EPO would normally not analyse sufficiency of disclosure in view of an inherent lack of inventive step.

Regarding the EPO, as general guidance to applicants it can be said that applicants cannot rely on those features in a claim that do not contribute to producing a technical effect in order to support inventive step (see T 641/00). Both in case C-4 (on brokering offers and demands in the field of transporting freight) and case C-8 ("Training a neural network ('drop-out')") the principles set out in T 641/00 result in a finding of lack of inventive step – in contrast to the JPO's acknowledgement of inventive step. It can therefore also be said that applicants to the EPO should include enough technical detail in the description and/or dependent claims as a fall-back position, such that technical features can possibly be added to a claim in support of a technical effect and/or inventive step (EPO Guidelines G-VII, 5.4).

The applicant who intends to file a software-related invention with the JPO is required to explicitly disclose the invention as "the creation of technical ideas utilizing the laws of nature" or "information processing by the software realized using hardware resources concretely", which is utilising the laws of nature as a whole to satisfy the criteria for subject-matter eligibility in the claim.

III. Comparative study of example cases

An overview of the results of the comparative study of example cases is shown below. In the following, ○ means not refused in terms of excluded or ineligible subject-matter, etc., × means refused and Δ means depending on the recitation in the claims, i.e. depending on the exact formulation of the claims.

A. The requirement to claim a statutory "invention"

	Claim	EPO	JPO
Case A-1	CL1	×	×
	CL2	○	○
	CL3	○	×
	CL4	○	×
Case A-2	CL1	○	×
	CL2	○	×
Case A-3	CL1	○	○
	CL2	○	○
	CL3	○	○
	CL4	×	×
Case A-4	CL1	×	○
	CL2	×	○
	CL3	○	○

B. Novelty

	Claim	EPO	JPO
Case B-1	CL1	×	×
	CL2	○	○

C. Inventive step

	Claim	EPO	JPO
Case C-1	CL1	Δ	○
Case C-2	CL1	○	○
Case C-3	CL1	×	○
Case C-4	CL1	×	○
Case C-5	CL1	×	○
Case C-6	CL1	×	×
	CL2	○	○
Case C-7	CL1	○	○
Case C-8	CL1	×	○

D. Sufficiency of disclosure/enablement requirement

	EPO	JPO
Case D-1	×	×
Case D-2	not applicable	○
Case D-3	○	○

A. The requirement to claim a statutory "invention"

1. Case A-1

(From JPHB, Annex A, 3, Case 3-3)

Title of invention

3D printing data of dolls and a 3D printing method of dolls

What is claimed is:

Claim 1

3D printing data of dolls read in a control unit of a 3D printer when a modeling unit of the said 3D printer models, characterized in that it includes three-dimensional shapes and color tones of dolls to be modeled.

Claim 2

A 3D printing method of dolls using the said 3D printer based on the 3D printing data of dolls as described in Claim 1, comprising;

— a step in which the said control unit reads in the said 3D printing data;
— a step in which the said control unit controls the said modeling unit in a way that it dispenses modeling resin based on the three-dimensional shape included in the said 3D printing data; and
— a step in which the said control unit controls the said modeling unit in a way that it dispenses colorants of a plurality of colors based on the color tones included in the 3D printing data.

Claim 3

The 3D printing data of dolls as described in claim 1 stored in a computer-readable storage medium.

Claim 4

A computer-readable storage medium having stored thereon the 3D printing data of dolls as described in claim 1.

Overview of the description – technical field

The present invention relates to 3D printing data of dolls and a 3D printing method of dolls.

Background art

In general, dolls made of synthetic resin are produced by means of mould injection. However, dolls are produced in small quantities and large varieties such that a number of moulds are required to produce these products by means of mould injection. This increases the production costs of dolls.

Problems to be solved by the invention

The present invention was realised in view of these circumstances and aims to provide dolls to society at a reasonable cost.

Solution for the problem to be solved

(Omitted)

Effect of invention

3D printing data of dolls in the present invention includes 3D shapes and colour tones of dolls to be modelled. Dolls can be easily produced by means of a 3D printer and they do not require moulds for mould injection. Therefore, dolls will be provided to society at a reasonable cost.

Conclusion (EPO)

Claim 1 does not fulfil the requirements of Article 52(2) and (3) EPC, i.e. it does not constitute an invention.

Claim 2 constitutes an invention within the meaning of Article 52(2) and (3) EPC since it is a method involving technical means (control unit controlling the printing process).

Claim 3 also constitutes an invention within the meaning of Article 52(2) and (3) EPC since it defines 3D printing data stored, or embodied, on a computer-readable storage medium (i.e. the claimed subject-matter requires the presence of technical means).

Similarly, claim 4 is an invention within the meaning of Article 52(2) and (3) EPC since it directly defines technical means, namely a computer-readable storage medium. Claim 4 is the preferred format for claiming a computer-implemented data format since one might argue that claim 3 merely defines a data format which is abstract and not limited by the feature "stored in a computer-readable storage medium".

Explanation (EPO)

Claim 1

The data defined by claim 1 constitutes the presentation of information as such. The meaning of the data claimed (shapes and colour tones) is irrelevant and would tend to reinforce the "presentation of information" argument.

The fact that the data is read in a control unit of a 3D printer is irrelevant as well, because this feature only relates to the purpose of the 3D data, but does not limit the data itself (unlike claim 2, claim 1 does not define a method). Moreover, data itself, when read in the control unit of a 3D printer, does not suffice to develop the requisite technical effect. In particular, 3D data cannot be regarded as functional data because it is not possible to infer, from the 3D data, the tech-

nical features of the system in which the 3D data is used. It is the control program which, fed with the data, develops the requisite technical effect.

At the EPO, the patentability of computer data structures is examined according to EPO Guidelines G-II, 3.6.3.

These sections of the EPO Guidelines reflect pertinent case law of the EPO boards of appeal.

Claim 2
Regarding claim 2, which constitutes an invention (see above), all features of the claim, with the sole exception of the meaning of the data, are considered technical and will be taken into consideration when comparing the claim with the prior art. However, prior art disclosing any data-driven similar 3D printing process will be relevant, independently of the meaning of the data (and thus independently of the printed object) in the prior art.

The printing data in the context of claim 2 is used to control the printing process (which shape and which colour will be given to the object printed, in this specific case a doll) and therefore relevant during processing. In other words, it is an essential feature of the printing process because, without this feature, the printing process cannot take place.

Claim 3
Regarding claim 3, non-functional data by itself, even if stored on a computer-readable storage medium, cannot produce a technical effect (analogously to a computer program lacking a further technical effect, e.g. solving a non-technical financial, administrative, commercial or cognitive task). It is only the interaction of data, the control program and the 3D printer that eventually produces this technical effect required in the context of assessing inventive step.

Claim 4
Analogous considerations apply to claim 4 (computer-readable storage medium with 3D printing data). The technical characteristics of the storage medium itself are not affected by the 3D printing data stored thereon. Therefore, the computer-readable storage medium with 3D printing data is, from an inventive step viewpoint, equivalent to a computer-readable storage medium with any data stored thereon. However, according to current EPO practice, if a computer program claim has been found allowable, a computer-readable storage medium storing the program is allowable as well.

Mere 3D data cannot acquire the status of functional data because there is insufficient information to infer the technical features of the system in which the data is used. However, data such as 3D data could be regarded as functional data if it was enriched with additional features that permitted such an inference of corresponding technical features.

Conclusion (JPO)
The invention of claim 1 does not fall under the term "invention". The invention of claim 2 falls under the term "invention".

The inventions of claims 3 and 4 do not fall under the term "invention".

Explanation (JPO)
Claim 1
Mere presentation of information (where the feature resides solely in the content of the information, and the main object is to present information), such as the presentation of information (presentation per se, means for presentation or method of presentation) in which a technical feature does not reside, does not fall under the term "invention" ("creation of a technical idea utilizing a law of nature") mentioned in the main paragraph of Article 29(1) JPA.

It is an ordinary operation of a 3D printer that the 3D printing data is "read in a control unit of a 3D printer when a modeling unit of the said 3D printer models", as described in claim 1. The 3D printing data of dolls in claim 1 does not add any technical feature to the means for or method of reading data in the control unit of the 3D printer, but is characterised only in terms of informational content in that "it includes three-dimensional shapes and color tones of dolls to be modeled". Therefore, the 3D printing data of claim 1 lacks technical features regarding the presentation of information (presentation per se, means for presentation or method of presentation); its feature resides solely in the content of the information, and its main object is to present information.

Therefore, since the 3D printing data of dolls in claim 1 is mere presentation of information, it is not a creation of a technical idea utilising a law of nature and thus does not fall under the term "invention".

Claim 2
The invention of claim 2 is a 3D printing method for dolls using a 3D printer using the computer software. The 3D printer controls a modelling unit in a way that it dispenses modelling resin and colourants of a plurality of colours based on 3D shapes and colour tones included in the 3D printing data. Therefore, the invention of claim 2 is what concretely performs control of the 3D printer, which is an apparatus, or processing with respect to the control.

Therefore, since the invention of claim 2 is a creation of a technical idea utilising a law of nature as a whole, it falls under the term "invention".

Claims 3 and 4
The same reasons apply as for claim 1.

2. Case A-2

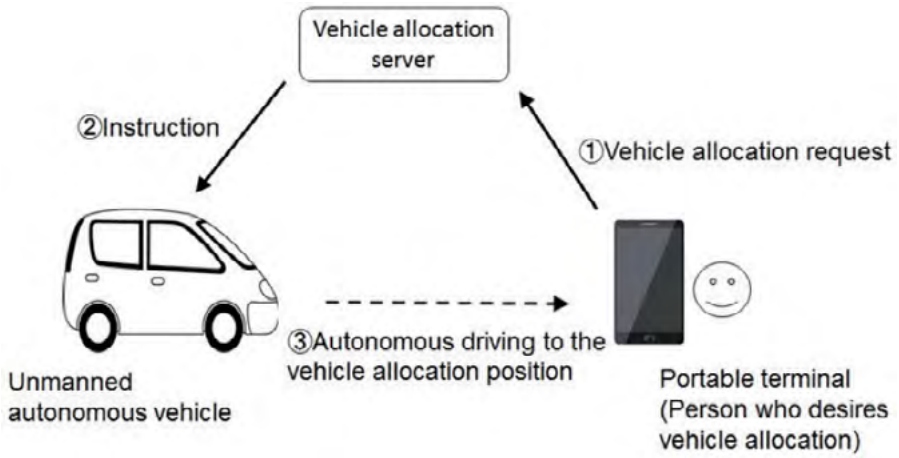
(From JPHB, Annex B, Chap. 1, 3.2, Case 2-10)

Title of invention
Method of Allocating Unmanned Autonomous Vehicle

What is claimed is:
Claim 1
A system comprising a vehicle allocation server, a portable terminal which a person who desires vehicle allocation has, and unmanned autonomous vehicles, wherein when the vehicle allocation server receives a vehicle allocation request for the unmanned autonomous vehicle for which a vehicle allocation position is specified from the person who desires the vehicle allocation, the vehicle allocation server allocates unmanned autonomous vehicle to the person who desires the vehicle allocation.

Claim 2
A method implemented in a system comprising a vehicle allocation server, a portable terminal which a person who desires vehicle allocation has, and unmanned autonomous vehicles, wherein when the vehicle allocation server receives a vehicle allocation request for the unmanned autonomous vehicle for which a vehicle allocation position is specified from the person who desires the vehicle allocation, the vehicle allocation server allocates unmanned autonomous vehicle to the person who desires the vehicle allocation.

Overview of the description



Background art
The present invention relates to a service utilising unmanned autonomous vehicles for which a driver is unnecessary and which is capable of performing autonomous driving within a predetermined site in an amusement park, a theme part or the like.

Problems to be solved by the invention
As moving means within a predetermined site in an amusement park, a theme park or the like, there is a vehicle, such as a shuttle bus, travelling along a specific route but there was not a service for providing visitors with a vehicle which freely moves within a large site like a taxi.

Description of the embodiments
A plurality of unmanned autonomous vehicles are deployed in a state in which the unmanned autonomous vehicles can freely travel within a predetermined site. A plurality of unmanned autonomous vehicles, a vehicle allocation server and a portable terminal can communicate with each other through the network. A user accesses the vehicle allocation server from their portable terminal in the site, thereby enabling an unmanned autonomous vehicle to move to the desired vehicle allocation position. The vehicle allocation server which has received the vehicle allocation request issues an instruction to the specific unmanned autonomous vehicle to travel towards the vehicle allocation position through the network. After arriving at the vehicle allocation position through autonomous driving, the unmanned autonomous vehicle urges the user to get on the unmanned autonomous vehicle. Accordingly, the user can move to the destination within the site in the sense of using a taxi.

Conclusion (EPO)
Claim 1, being a system claim, fulfils the requirements of Article 52(2) and (3) EPC and is therefore an invention.

Method claim 2 also fulfils the requirements of Article 52(2) and (3) EPC and is therefore an invention.

Explanation (EPO)
According to current EPO practice, all system claims are considered inventions within the meaning of Article 52(2) and (3) EPC. According to current EPO practice, method claims are considered inventions within the meaning of Article 52(2) and (3) EPC if they involve technical means, which claim 2 clearly does.

The claims define that the input to the vehicle allocation server is a vehicle allocation position specified by a person who desires a vehicle allocation (called the "requester" in the following). Using the position specified by the requester, a vehicle is allocated. However, a mere allocation (i.e. vehicle X is allocated to requester Y) is of an abstract, and thus non-technical, nature and does not produce a technical effect beyond the mere fact of being computer-implemented.

Indeed, such an allocation can be thought of as merely an internal state of the server that has no further technical consequence if left unused.

Having regard to the description and the figure, what appears to be missing in the claim is an allocated vehicle adapted to drive autonomously to the requested position. If that feature were included in the claim, the resulting technical effect would be, defined by the claim in very broad terms, to provide a vehicle to the requester at a requested location. In addition, it is noted that the system claim is defined in terms of method steps, rather than structural features. In order to avoid objections under Article 84 EPC, formulations such as "the vehicle allocation server is adapted to receive" should be used instead of "the vehicle allocation server receives".

For this reason, and for the time being, no final conclusion can be reached as to which features will be taken into consideration in a comparison with the prior art.

However, if the claim is left unamended, it can be said that the constituent parts of the system (i.e. server, portable terminal, unmanned vehicle) and the functionality of sending and receiving requests between the server and the portable terminal are all considered technical.

For the question of which features of claim 2 are technical (i.e. solve a technical problem), considerations similar to those for system claim 1 above apply.

Conclusion (JPO)
The invention of claim 1 does not fall under the term "invention". The invention of claim 2 does not fall under the term "invention".

Explanation (JPO)
The invention of claims 1 and 2 recites "unmanned autonomous vehicles". However, the invention of claims 1 and 2 does not at all recite either the control of the unmanned autonomous vehicles nor the information processing performed by the unmanned autonomous vehicles. Therefore, the invention of claims 1 and 2 does not fall under either of (a) inventions concretely performing control of an apparatus or processing with respect to the control or (b) inventions concretely performing information processing based on the technical properties, such as the physical, chemical, biological or electric properties, of an object described in JP Guidelines, Part III, Chap. 1, 2.2 (2).

Then, it is determined "whether or not information processing by software is specifically implemented by using hardware resources". Claims 1 and 2 specify that a system comprising a vehicle allocation server, a portable terminal and an unmanned autonomous vehicle is used. However, it is specified merely "when the vehicle allocation server receives a vehicle allocation request for the unmanned autonomous vehicle for which a vehicle allocation position is specified from the person who desires the vehicle allocation, the vehicle allocation server allocates unmanned autonomous vehicle to the person who desires the vehicle allocation", and no information processing is specified. Therefore, it is not possible to determine that specific calculation or processing of information depending on the intended use, which is an allocation of unmanned autonomous vehicles, is specified. For this reason, in the invention of claims 1 and 2, a specific information processing system or an operation method thereof depending on the intended use is not constructed through co-operation of software and hardware resources.

Therefore, since the information processing by software is not specifically implemented by using hardware resources, the invention of claims 1 and 2 is not a creation of a technical idea utilising a law of nature, and thus does not fall under the term "invention".

3. Case A-3

(From JPHB, Annex B, Chap. 1, 3.2, Case 2-11)

Title of invention

Tree-Structured Area Management Data, Contents Data Distribution Method and Contents Data Method of Allocating

What is claimed is:

Claim 1

Tree-structured area management data comprising in the order of single-layer root node, multi-layer intermediate nodes and single-layer leaf nodes from top, wherein;

— the said leaf nodes have location information on distribution areas and contents data;

— among the said intermediate nodes, those equipped with the said plurality of leaf nodes underneath have pointers to the said plurality of leaf nodes underneath and location information having a minimum bounding rectangle that bounds the said plurality of distribution areas corresponding to the plurality of leaf nodes underneath with the minimum area;

— among the said intermediate nodes, those equipped with a plurality of intermediate nodes underneath have pointers to the said plurality of intermediate nodes underneath and location information of the minimum bounding rectangle that bounds the said minimum bounding rectangles owned by the plurality of intermediate nodes underneath with the minimum area;

— the said root node has pointers to the said plurality of intermediate nodes underneath;

wherein the tree-structured area management data is stored in a contents distribution server; and

— it is used by the said contents distribution server to perform processing to identify leaf nodes corresponding to distribution areas that geographically bound current location information input as a search key in accordance with the pointers owned by root node or intermediate nodes.

Claim 2

A contents data distribution method wherein;

a contents distribution server that stored the tree-structured area management data described in Claim 1

— acquires current location information as a search key;

— identifies intermediate nodes corresponding to the minimum bounding rectangle that geographically contain the said current location information by comparing location information of the minimum bounding rectangle owned by the said plurality of intermediate nodes underneath the said root nodes with the said current location information;

repeats a comparison of location information of the minimum bounding rectangle owned by the said plurality of subordinate intermediate nodes of the said identified intermediate nodes or location information of the said distribution areas owned by the said plurality of leaf nodes with the said current location information until leaf nodes corresponding to distribution areas that geographically contain the said current location information are identified; and

— distributes contents data owned by the said identified leaf nodes to users.

Claim 3

The contents data distribution method described in Claim 2 wherein the said contents data relates to

data on items or characters used on gaming applications that run on gaming machines of users.

Claim 4

The contents data distributed to users by means of the method described in Claim 3.

Drawings

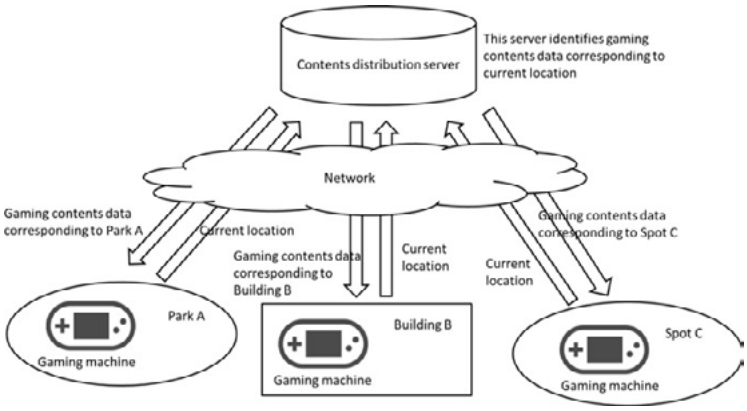


Figure 1

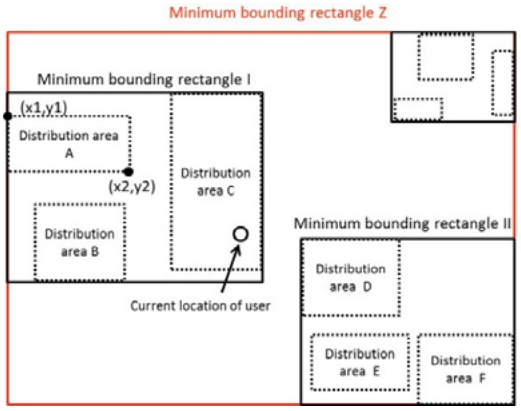


Figure 2

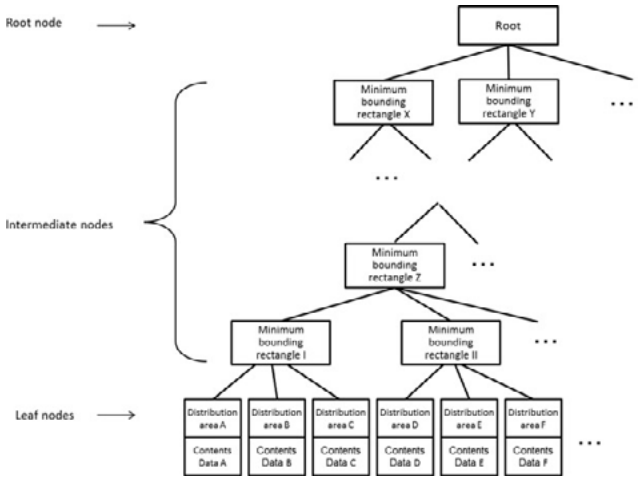


Figure 3

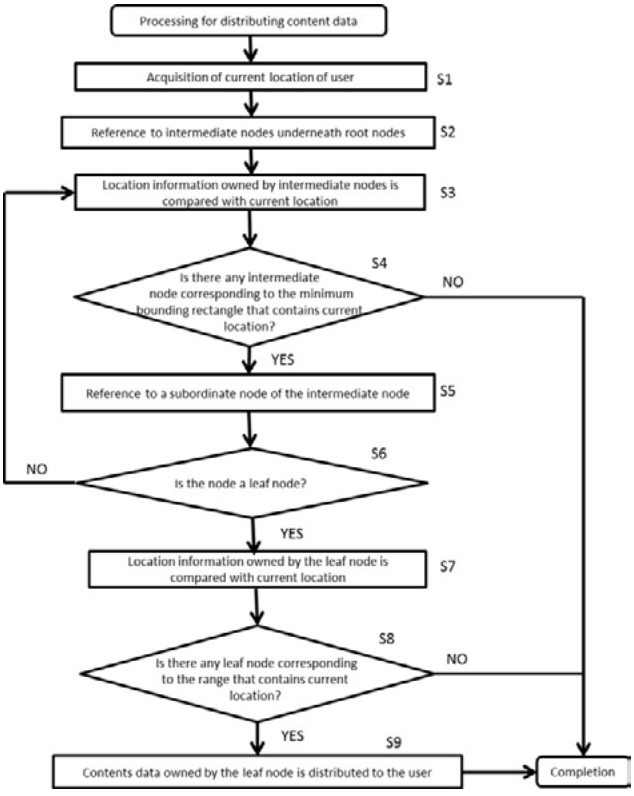


Figure 4

Overview of the description

Technical field

The present invention relates to a data structure for a technology to distribute contents data to users.

Background art

As described in Figure 1, there is a service for users who own gaming machines that run on specific gaming applications within specific distribution areas on a map to distribute contents data on gaming related to the distribution areas to their gaming machines. In this service, if a user is found to be in a specific distribution area while they are in transit, contents data related to the distribution area is automatically distributed to their gaming machine. Moreover, it is envisaged that the user physically moves to a specific distribution area where they may receive desired contents data in order to acquire it.

Problems to be solved by the invention

However, in order to increase a game element of those applications, it is necessary to set an enormous number of distribution areas. In the conventional techniques, it was necessary to compare location information on all distribution areas and the current locations of users so as to identify distribution areas that geographically contain the current locations of users. This posed a large computing burden.

Solution for the problem to be solved

(Omitted)

Description of the embodiments

The contents distribution server acquires current location information of users from their gaming machines as a search key, identifies distribution areas that geographically contain the current location information and distributes contents data corresponding to the identified distribution areas to users. The gaming machines are equipped with a communication function and current location acquisition function. Contents data includes that related to items and characters used on gaming applications that run on those gaming machines. The contents distribution server manages distribution areas and contents data in a way that they are included in tree-structured area management data as described below and stored in a memory part thereof.

Data structure of area management data

Each distribution area defines location information based on information on latitude and longitude (x1, y1) (x2, y2) in the rectangular diagonal position. A distribution area is bounded by one minimum bounding rectangle together with one or more distribution areas nearby. The minimum bounding rectangle refers to a rectangle that bounds a plurality of distribution areas with the minimum area and defines location information based on information on latitude and longitude in the rectangular diagonal position in the same manner as the distribution areas. A minimum bounding rectangle is bounded by a superordinate minimum bounding rectangle together with one or more minimum bounding rectangles nearby. In this way, a tree structure composed of a plurality of distribution areas and minimum bounding rectangles is formed.

A root node is in the uppermost position of the data structure. Nodes corresponding to minimum bounding rectangles are called intermediate nodes, while those corresponding to distribution areas are called leaf nodes. A root node has pointers to a plurality of intermediate nodes underneath. Each intermediate node has location information on a corresponding minimum bounding rectangle and pointers to a plurality of subordinate intermediate nodes or leaf nodes. Each leaf node has location information on the corresponding distribution area and contents data.

Figure 2 is an illustrative example of distribution areas and minimum bounding rectangles. The distribution areas A to C are bounded by minimum bounding rectangle I and the distributions areas D to F by minimum bounding rectangle II.

Figure 3 represents a structure of area management data formed in the case of Figure 2. The intermediate node corresponding to minimum bounding rectangle I has pointers to the leaf nodes corresponding to the distribution areas A to C, while that corresponding to minimum bounding rectangle II has pointers to the leaf nodes corresponding to the distribution areas D to F. The uppermost root node has pointers to each of the intermediate nodes. Contents data is associated with each of the leaf nodes.

Processing for contents data distribution

Figure 4 is used to explain processing for distributing contents data performed by the contents distribution server. Once the server acquires the current location information of a user from their gaming machine as a search key (S1), it refers to the intermediate nodes underneath the root node (S2) and compares location information owned by the intermediate nodes with the current location information (S3). Based on this comparison, it is determined whether or not there is any node corresponding to the minimum bounding rectangle that geographically contains the current location information (S4) and, if that is the case, subordinate nodes of the intermediate node are referred to (S5). If there is no such node, it is determined that there are no users in any of the distribution areas, and the processing completes and

processing for distributing contents data is not performed. Then, whether or not the subordinate nodes of the intermediate node are leaf nodes is determined (S6). If they are not leaf nodes, that is, if they are intermediate nodes, the process returns to (S3) and the procedures of (S3) to (S5) are repeated until those nodes reach a leaf node. If they are found to be leaf nodes, location information on distribution areas owned by the leaf nodes and the current location information are compared (S7) to determine whether or not there is any leaf node corresponding to the distribution area that geographically contains the current location information (S8). If there is such a leaf node, contents data owned is distributed to the user (S9). On the other hand, if there is no such leaf node, it is determined that there are no users in any of the distribution areas, and the processing completes and processing for distributing contents data is not performed.

Specific processing for distributing contents data is shown using the examples in Figures 2 and 3. In these examples, a user exists in the distribution area C. By repeating the process of comparing location information on distribution areas owned by the root node and intermediate nodes with the current location information, it is determined that the current location information is contained geographically in minimum bounding rectangle I. Then, location information on the distribution areas A to C owned by the leaf nodes of the intermediate node corresponding to minimum bounding rectangle I is compared with the current location information to determine whether or not it is contained geographically in the distribution area C. Therefore, contents data owned by the leaf node corresponding to the distribution area C is distributed to the user.

As discussed here, the management of distribution areas with a tree structure only requires the processing of comparisons for the number of stages of the tree structure in order to identify distribution areas that geographically contain the current location information of users that was input as search keys. As a result, this method may identify distribution areas at higher speed compared to the conventional technique of comparing location information on all distribution areas with the current locations of users.

Conclusion (EPO)

Claim 1 is an invention within the meaning of Article 52(2) and (3) EPC since it defines physically embodied data including the data structure.

Claim 2 is also an invention within the meaning of Article 52(2) and (3) EPC since it defines a computer-implemented method. Claim 3 is dependent on claim 2 and belongs to the same category; therefore it is an invention within the meaning of Article 52(2) and (3) EPC.

Claim 4 is a claim to data as such and thus does not constitute an invention within the meaning of Article 52(2) and (3) EPC.

Explanation (EPO)

Claim 1

At the EPO, the patentability of computer data structures is examined according to EPO Guidelines G-II, 3.6.3.

These sections of the EPO Guidelines reflect pertinent case law of the EPO boards of appeal.

Considering claim 1 as a whole, it is evident that claim 1 essentially refers to a data structure.

According to EPO Guidelines G-II, 3.6.3, a computer-implemented data structure embodied on a medium has technical character. In this example, the claim defines tree-structured area management data, including its structure, and further comprises a limitation to the fact that the data is stored in a contents distribution server. The subject-matter defined by claim 1 is thus an invention within the meaning of Article 52(2) and (3) EPC. However, independently from the above, the question arises whether the data defined by the claim is suitable to make a contribution to an inventive step. Such a contribution can only be acknowledged if the data is functional data. Board of appeal decision T 1194/97, for example, held that functional data includes a data structure defined in terms which inherently comprise the technical features of the system in which the medium storing the data is operational.

Claim 2

Claim 2 is drafted as a method of data storage and retrieval, involving technical means and the data structure defined by claim 1. Those features of claim 2 referring to the structure of the data are considered technical. Those features referring to the content (i.e. meaning) of the data are considered non-technical.

Claim 3

Analogous considerations apply to claim 3, which is dependent on claim 2.

Claim 4

At the EPO, the patentability of computer data structures is examined according to EPO Guidelines G-II, 3.6.3. These sections of the EPO Guidelines reflect pertinent case law of the EPO boards of appeal.

Independently from the above, it can be argued that the data claimed constitutes the presentation of information as such (the nature of the claimed data does not change by specifying that it has been distributed in a certain manner). The meaning of the data claimed is thus irrelevant, reinforcing the "presentation of information" argument.

Conclusion (JPO)
The inventions of claims 1 to 3 fall under the term "invention".

The invention of claim 4 does not fall under the term "invention".

Explanation (JPO)
Claim 1
The area management data of claim 1 is data having a structure capable of identifying distribution areas that geographically contain the current location information input as a search key by means of information processing in accordance with pointers owned by root nodes and intermediate nodes. Thus, the "structured data" has characteristics similar to a computer program in that a structure the data has specifies information processing by a computer, such that this structured data is determined to be equivalent to a computer program.

Moreover, it is determined, from the statement of claim 1, that computing or processing of specific information in accordance with its purpose of use, that is, the identification of distribution areas including the current location information input as a search key, is realised by specific means or specific procedures, that is, a series of information processing by the contents distribution server that stores area management data, by means of co-operation between the software ("structured data" equivalent to a computer program) and hardware resources. The "structured data" is thus determined to establish an operating method of a specific information processing device in accordance with the purpose of use by means of co-operation between the software and hardware resources.

Therefore, as information processing specified with the "structured data", which is equivalent to a computer program, is realised specifically using hardware resources, the area management data of claim 1 is a creation of a technical idea utilising a law of nature and thus falls under the term "invention".

Claim 2
It is determined, from the description of claim 2, that computing or processing of specific information in accordance with its purpose of use, that is, the distribution of contents data in accordance with the current location information input as a search key, is realised by specific procedures, that is, a series of information processing by the contents distribution server that stores area management data, by means of co-operation between the software and hardware resources. The method of claim 2 is thus determined to establish an operating method of a specific information processing device in accordance with the purpose of use by means of co-operation between the software and hardware resources.

Therefore, as information processing by the computer program is realised specifically using hardware resources, the method of claim 2 is a creation of a technical idea utilising a law of nature and thus falls under the term "invention".

Claim 3
Since claim 3 cites claim 2, it is determined, from the description of claim 3, that computing or processing of specific information in accordance with its purpose of use, that is, the distribution of contents data in accordance with the current location information input as a search key, is realised by specific procedures, that is, a series of information processing by the contents distribution server that stores area management data, by means of co-operation between the software and hardware resources, in the same manner as for the determination made for claim 2. The method of claim 3 is thus determined to establish an operating method of a specific information processing device in accordance with the purpose of use by means of co-operation between the software and hardware resources.

Therefore, as information processing by the computer program is realised specifically using hardware resources, the method of claim 3 is a creation of a technical idea utilising a law of nature and thus falls under the term "invention".

Claim 4
Mere presentation of information (where the feature resides solely in the content of the information, and the main object is to present information), such as the presentation of information (presentation per se, means for presentation or method of presentation) in which a technical feature does not reside, does not fall under the term "invention" ("creation of a technical idea utilising a law of nature") mentioned in the main paragraph of Article 29(1) JPA.

The contents data of claim 4 relates to data on items or characters used on gaming applications that run on gaming machines of users. The only thing identified is that such data is distributed from the contents distribution server to users.

The distribution processing and the distribution method do not have any technical features. Therefore, the contents data of claim 4 does not have technical features in the presentation of information (presentation per se, means for presentation or method of presentation); its feature resides solely in the content of the information in that "it is data on items or characters used on gaming applications that run on gaming machines of users", and its main object is to present information. Moreover, since the contents data is owned only by the leaf nodes of area management data and its structure does not specify any information processing by computers, it is not "structured data" equivalent to a computer program either.

Therefore, since the contents data of claim 4 is mere presentation of information, it is not a creation of a technical idea utilising a law of nature as a whole and thus does not fall under the term "invention".

4. Case A-4

(From JPHB, Annex B, Chap. 1, 3.2, Case 2-14)

Title of invention

Trained Model for Analyzing Reputations of Accommodations

What is claimed is:

Claim 1

A trained model for causing a computer to function to output quantified values of reputations of accommodations based on text data on reputations of accommodations, wherein;

— the model is comprised of a first neural network and a second neural network connected in a way that the said second neural network receives output from the said first neural network;

— the said first neural network is comprised of an input layer to intermediate layers of a feature extraction neural network in which the number of neurons of at least one intermediate layer is smaller than the number of neurons of the input layer, the number of neurons of the input layer and the number of the output layer are the same, and weights were trained in a way each value input to the input layer and each corresponding value output from output layer become equal;

— weights of the said second neural network were trained without changing the weights of the said first neural network; and

— the model causes the computer function to perform a calculation based on the said trained weights in the said first and second neural networks in response to appearance frequency of specific words obtained from the text data on reputations of accommodations input to the input layer of the said first neural network and to output the quantified values of reputations of accommodations from the output layer of the said second neural network.

Claim 2

A computer program for causing a computer to function to output quantified values of reputations of accommodations based on text data on reputations of accommodations, wherein;

— the program is comprised of a first neural network and a second neural network connected in a way that the said second neural network receives output from the said first neural network;

— the said first neural network is comprised of an input layer to intermediate layers of a feature extraction neural network in which the number of neurons of at least one intermediate layer is smaller than the number of neurons of the input layer, the number of neurons of the input layer and the number of the output layer are the same, and weights were trained in a way each value input to the input layer and each corresponding value output from output layer become equal;

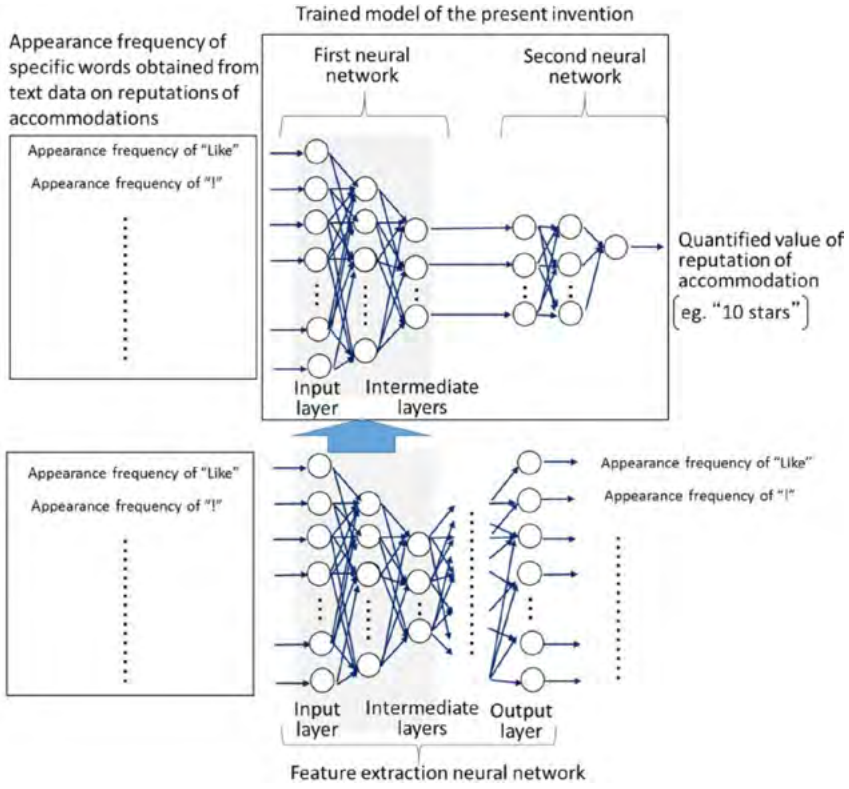
— weights of the said second neural network were trained without changing the weights of the said first neural network; and

— the program causes the computer function to perform a calculation based on the said trained weights in the said first and second neural networks in response to appearance frequency of specific words obtained from the text data on reputations of accommodations input to the input layer of the said first neural network and to output the quantified values of reputations of accommodations from the output layer of the said second neural network.

Claim 3

A computer-readable storage medium having stored thereon the computer program as described in claim 2.

Drawing



Overview of the description

(Note) The description is written on the premise of claim 1. For claims 2 and 3, please read the description on the assumption that "trained model" is replaced with "computer program". For claim 3, please also assume that the description discloses a computer-readable storage medium having stored thereon the "computer program".

Background art

A neural network, which has a computer function as a computing unit to calculate output in response to certain input, is capable of performing complicated information processing at high speed by being trained from a number of actual examples. Therefore, people use neural networks for various purposes in such fields as image recognition, voice recognition, voice synthesis and automated translation.

Generally, in cases where neural networks are utilised in new areas, in many cases it is not clear what should be input as the input feature values, and therefore it is necessary to carefully review what should be selected as the input feature values.

In order to analyse text data on the reputations of different accommodation, such as hotels, posted on travel review sites with neural networks, it is not straightforward to select the input feature values because the appearance frequencies of a variety of words ("Like", "!", etc.) included in the text data can be considered candidate input feature values.

Problems to be solved by the invention

The present invention has been conceived in view of the above problems and aims to accurately analyse the reputations of different accommodation even if the input feature values are not properly preselected.

Solution for the problem to be solved

The trained model of the present invention aims to cause a computer to function to output quantified values of the reputations of different accommodation based on text data on the reputations of different accommodation and is comprised of a first neural network and a second neural network connected in a way that the second neural network receives output from the first neural network. The trained model is supposed to be utilised as a program module which constitutes a part of artificial intelligence software.

The trained model of the present invention is utilised in a computer equipped with a CPU and a memory. Specifically, the CPU of the computer operates, in accordance with

instructions from the trained model stored in the memory, in a way that it performs a calculation based on trained weights and response functions in the first and second neural networks in response to data input to input layers of the first neural network (appearance frequency of specific words obtained from text data on the reputations of different accommodation, e.g. by performing morphological analyses) and outputs results from output layers of the second neural network (quantified values of reputations, e.g. "10 stars").

The first neural network is comprised of an input layer to intermediate layers of a feature extraction neural network. This feature extraction neural network is generally called an autoencoder. In this network, the number of neurons in the intermediate layers is smaller than the number of neurons in the input layer. The number of neurons in the input layer and the number of neurons in the output layers are set to be equal. Moreover, a response function of each of the neurons in the input and output layers is a linear function, and other response functions of each of the neurons are sigmoid functions (1/(1+exp(-x))).

The feature extraction neural network is trained by means of a well-known art called a back-propagation method and weights between neurons are updated. In the embodiment of the present invention, this neural network is trained to minimise mean square errors for overall input data so that data (appearance frequency of each of a plurality of words obtained from text data on the reputations of different accommodation by performing morphological analyses) is input in the input layers and data the same as this input data is output from the output layers. Since sigmoid functions which are non-linear functions are utilised as neuron response functions, the weights between neurons are not symmetrical across the intermediate layer. As the feature extraction neural network is trained, it becomes possible for the intermediate layer to obtain feature values representing the characteristics of each set of input data. Although the feature values that appear in the intermediate layer do not necessarily have a clear physical implication, they are considered as compressed information to the extent that information input to the input layer can be restored via the intermediate layer to information output from the output layer, and the feature values that appear in the intermediate layer converge to similar values regardless of the feature values input to the input layer. Therefore, it is not necessary to properly preselect the feature values input to the input layer any more.

In the present invention, the part from the input layer to the intermediate layers in the feature extraction neural network in which weights were trained is connected to the second neural network as the first neural network. Weights of the second neural network are trained without changing weights of the said first neural network. The training is performed by a well-known art called a back-propagation method, as explained earlier.

Since the trained model of the present invention is comprised of the above first and second neural networks, it can accurately analyse the reputations of different accommodation without presetting of the feature values.

Conclusion (EPO)

Claim 1 defines a model that comprises a trained neural network and which causes a computer to perform a calculation. It is unclear, however, how a model, which is of an abstract nature and unlike a computer program does not comprise instructions that a computer can carry out, causes the computer to carry out said calculation. Is it necessary, for example, to convert the model into a computer program in order to cause the computer to perform said calculation?

It is thus unclear whether the claim merely defines an abstract method that could be used by a computer if it was programmed accordingly. Consequently, claim 1 does not define an invention within the meaning of Article 52(2) and (3) EPC.

Claim 2, on the other hand, defines a computer program. Here, the question to be answered is whether the subject-matter of claim 1 produces a further technical effect, i.e. whether it solves a technical problem – as opposed to a commercial, administrative, financial one, etc. – which goes beyond the "normal" physical interactions between the program (software) and the computer (hardware) on which it is run. The problem solved by the computer program of claim 1 is, according to the claim, the categorisation of the reputations of different accommodation, which is clearly a commercial problem.

Therefore, the subject-matter of claim 1 lacks the requisite further technical effect and does not constitute an invention within the meaning of Article 52(2) and (3) EPC.

However, if the claim referred to a technical problem to be solved (as opposed to the present commercial problem), claim 1 would probably constitute an invention within the meaning of Article 52(2) and (3) EPC.

Similar considerations apply to claim 2.

The computer-readable storage medium of claim 3 is normally a device, and therefore it constitutes an invention in accordance with Article 52(2) and (3) EPC.

Explanation (EPO)

Claim 1

Regarding claim 1, it can of course be argued that the claim goes beyond the mere commercial effect, in that it defines the structure and function of the corresponding neural network, as well as a categorisation process. If the categorisation were an element of a technical process (e.g. pattern recognition of handwriting), the claim might be considered an invention within the meaning of Article 52(2) and (3) EPC. In this case, all features referring to the structure and function of the neural network (e.g. layer structure, transfer function) would be considered technical.

Claim 2

Similar considerations apply to claim 2.

Claim 3

Regarding claim 3, according to current EPO practice, the technical characteristics of the storage medium itself are not affected by the program stored thereon. Therefore, the computer-readable storage medium is, from an inventive step viewpoint, equivalent to a computer-readable storage medium with any program stored thereon.

As general remark, not necessarily referring to the present case, it is noted that the EPO has duly considered clarity requirements regarding the definition of neural networks. The above-mentioned features (layer structure, transfer function of the neurons) and any other feature necessary for the neural network to develop its functionality are considered essential features of a neural network and therefore should be defined in the claim for compliance with the clarity requirements of Article 84 EPC.

Conclusion (JPO)

The invention of claim 1 falls under the term "invention". The invention of claim 2 falls under the term "invention". The invention of claim 3 falls under the term "invention".

Explanation (JPO)

Claim 1

The trained model of claim 1 is what "causes a computer to function to output quantified values of reputations of accommodations based on text data on reputations of accommodations" as well as what "causes the computer function to perform a calculation based on the said trained weights in the said first and second neural networks in response to appearance frequency of specific words obtained from the text data on reputations of accommodations input to the input layer of the said first neural network and to output the quantified values of reputations of accommodations from the output layer of the said second neural network".

Moreover, considering the description, which states that "the trained model is supposed to be utilized as a program module which constitutes a part of artificial intelligence software" and "the CPU of the computer operates, in accordance with instructions from the trained model stored in the memory, in a way that it performs a calculation based on trained weights and response functions in the first and second neural networks in response to data input to input layers of the first neural network (appearance frequency of specific words obtained from text data of reputations of accommodations, e.g. by performing morphological analyses) and outputs results from output layers of the second neural network (quantified values of reputations, e.g. '10 stars')", it is clear that the trained model of claim 1 is a "program" even though the claimed subject-matter of claim 1 is described as a "model".

Moreover, it is determined, from the statement of claim 1, that specific calculation or processing of specific information depending on the intended use, which is accurate analysis of the reputations of different accommodation, is implemented by specific means or specific procedures on which software and hardware resources co-operate, namely for a computer to "function to perform a calculation based on the said trained weights in the said first and second neural networks in response to appearance frequency of specific words obtained from the text data on reputations of accommodations input to the input layer of the said first neural network and to output the quantified values of reputations of accommodations from the output layer of the said second neural network". For this reason, in the trained model of claim 1, a specific information processing system depending on the intended use is constructed through co-operation of software and hardware resources.

Therefore, since the information processing by software is specifically implemented by using hardware resources, the trained model of claim 1 is a creation of a technical idea utilising a law of nature and thus falls under the term "invention".

Claim 2

It is determined, from the statement of claim 2, that specific calculation or processing of specific information depending on the intended use, which is accurate analysis of the reputations of different accommodation, is implemented by specific means or specific procedures on which software and hardware resources co-operate, namely for a computer to "function to perform a calculation based on the said trained weights in the said first and second neural networks in response to appearance frequency of specific words obtained from the text data on reputations of accommodations input

to the input layer of the said first neural network and to output the quantified values of reputations of accommodations from the output layer of the said second neural network".
For this reason, in the computer program of claim 2, a specific information processing system depending on the intended use is constructed through co-operation of software and hardware resources.

Therefore, since the information processing by software is specifically implemented by using hardware resources, the computer program of claim 2 is a creation of a technical idea utilising a law of nature and thus falls under the term "invention".

Claim 3
The same reasons apply as for claim 2.

B. Novelty

1. Case B-1

(From JPHB, Annex A, 4, Case 35)

Application
Title of invention
Robot Apparatus

What is claimed is:
Claim 1
A robot apparatus which acts on an object comprising:

— at least one kind of sensor for detecting the object;

— a transmission section for transmitting a query to a server in order to acquire information on the object based on an output of the sensor;

— a reception section for receiving response information answering the query from the server; and

— a control section storing a program which controls the operation of the robot apparatus on the basis of the received response information;

— wherein the response information is the information on a type of the said object specified by the said server on the basis of information received via a network from a production facility of the said object.

Claim 2
A robot apparatus which acts on an object comprising:

— at least one kind of sensor for detecting the object;

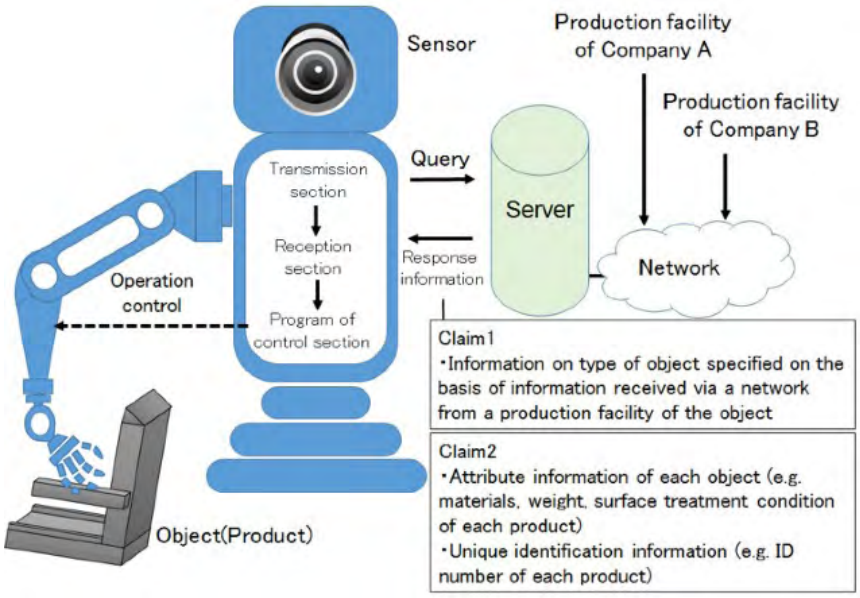
— a transmission section for transmitting a query to a server in order to acquire information on the object based on an output of the sensor;

— a reception section for receiving response information answering the query from the server; and

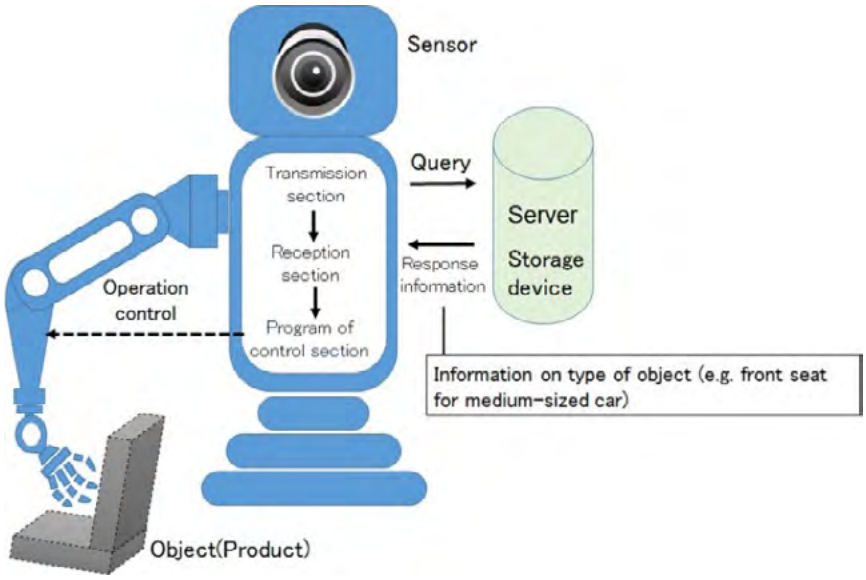
— a control section storing a program which controls the operation of the robot apparatus on the basis of the received response information;

— wherein the response information contains the attribute information and the unique identification information of each of the said object specified by the said server.

Drawing in the application



Drawing in the prior art



Overview of the description

Solution for the problem to be solved

The invention as claimed in claim 1 is directed to a robot apparatus capable of accurately determining a type of a product as an object to be handled, on the basis of the latest information acquired from a production facility of the product, thereby achieving appropriate handling of the product.

The invention as claimed in claim 2 is directed to a robot apparatus capable of achieving appropriate handling of individual products and reporting of information acquired as to the products, even when each of the products as an object to be handled has a different specification.

Embodiment 1

In an embodiment of the invention according to claim 1, the robot apparatus performs work such as transferring, at an assembly plant such as an automobile manufacturing factory, various types of products delivered as assembly parts

from a number of parts manufacturing companies. The robot apparatus has a gripping unit for grasping a product and an image sensor capable of obtaining images of the product.

In the robot apparatus, the image sensor detects, as image information, information such as the shape of a product being handled by the robot apparatus, a company name indicated on the product and a serial number assigned to each product according to a system prescribed for each type of product. The transmission section sends a query for acquiring information on the type of the product to a server based on an output of the image sensor. The query contains image information.

The server is connected via a network to a computer system of a production facility of each product manufacturing company and stores the latest information on products. When the server receives the query from the robot apparatus, it analyses the image information to specify the type of the product and sends the information back to the robot apparatus as response information.

In the robot apparatus, a reception section receives the response information, and a program of a control section controls the operation of the robot apparatus on the basis of the response information.

In the present embodiment, the robot apparatus performs operation control on the basis of the information that the server received from the production facility of the product via a network. Therefore, the robot apparatus can accurately determine the type of the product on the basis of the latest information. This contributes to appropriate handling of the product.

Embodiment 2
In an embodiment of the invention according to claim 2, a robot apparatus has a gripping unit, an image sensor and a transmission section, similarly to embodiment 1.

In the present embodiment, the transmission section sends a server a query for identifying an individual product and acquiring relevant information based on an output of the image sensor.

The server is connected to a computer system of a production facility of each product manufacturing company via a network, and stores information on product lines in a systematically organised and continuously updated manner. When the server receives a query from the robot apparatus, it analyses image information to identify each individual product and sends attribute information, such as materials used, weight and surface treatment condition of each one of the products, and unique identification information (e.g. ID number uniquely and systematically assigned to each of all the products to be handled) to the robot apparatus as response information.

In the robot apparatus, a reception section receives the response information, and a program of a control unit controls the operation of the robot apparatus on the basis of the response information.

In this embodiment, the robot apparatus receives response information containing the attribute information, such as materials, weight and surface treatment condition, and the unique identification information of each individual product and, on the basis of the information, controls its own operation. This enables appropriate handling, etc., of each product. More specifically, this enables a control of the gripping unit in such a manner that the gripped portion of the product and the gripping force can be optimised to each individual product. Information (e.g. rigidity of the gripped portion) acquired by the control section of the robot apparatus when the gripping unit grips the product can be sent from the transmission section to the server with the unique identification information. This enables the robot apparatus to perform the feedback of such information to the server and the addition to and updating of the attribute information of the product. Thus, the added or updated attribute information may be used for the next gripping of the same product or shared with the other robot apparatus connected to the server. For the sake of the subsequent handling of the product in the assembly factory, the robot apparatus can affix to the product a seal showing a printed identification symbol or number, or attach an ID tag to the product, on the basis of the unique identification information. Furthermore, in a case where the robot apparatus detects abnormality such as damage to the product, the robot apparatus can also report it to the server with the unique identification information.

Prior art
Title of invention (prior art)
Robot Apparatus

What is claimed is:
A robot apparatus which acts on an object comprising:

— at least one kind of sensor for detecting the object;

— a transmission section for transmitting a query to a server in order to acquire information on the object based on an output of the sensor;

— a reception section for receiving response information answering the query from the server; and

— a control section storing a program which controls the operation of the robot apparatus on the basis of the received response information;

— wherein the response information is the information on a type of the said object specified by the said server.

Overview of the description (prior art)
In the robot apparatus, an image sensor detects, as image information, information such as the shape of a product being handled by the robot apparatus, a company name indicated on the product and a serial number assigned to each product according to a system prescribed for each type of product. A transmission section sends a query for acquiring information on the type of a product to a server based on an output of the image sensor. The query contains image information.

When the server receives the query from the robot apparatus, it compares the image information of the query with information stored in a storage device of the server to determine the type of an object. Then, the server sends the information on the type of the object, e.g. a front seat for a medium-sized car, to the robot apparatus as a response. The robot apparatus controls the operation of a gripping unit, etc., on the basis of the response information.

Conclusion (EPO)
Claim 1 lacks novelty. However, this objection is easily overcome, as indicated in the explanation.

Claim 2 is novel.

Explanation (EPO)
Claim 1
Claim 1 appears to differ from the prior art in that it further specifies that the received response information, which is received from a server, is (determined) "on the basis of information received via a network from a production facility of the said object". However, since the claim defines a robot apparatus that merely communicates, via a transmission section and a reception section, with a server, the server, the network and the production facility do not seem to be part of the claimed subject-matter. Hence, any claim limitation which does not limit the robot apparatus, but some other unclaimed device, cannot result in a novel claim. Claim 1 thus lacks novelty.

However, if, for example, the routing of information between the server and the production facility were part of the claimed subject-matter, and this was clarified by way of amendment, then claim 1, which is not directed to a system comprising a robot, a server and a production facility but directed to a robot, would be novel, because the prior art does not disclose such routing of information.

Claim 2
Similar considerations apply to system claim 2. However, claim 2 differs from claim 1 in that the response information is attribute information and a unique identification of the object. Therefore, claim 2 is clearly novel.

Conclusion (JPO)
The invention of claim 1 lacks novelty. The invention of claim 2 is novel.

Explanation (JPO)
Claim 1
The robot apparatus is a sub-combination, which is a part of a combination of the robot apparatus and the server.

Claim 1 to the robot apparatus recites a feature related to the server (the other sub-combination), namely, "the response information is the information on a type of the said object specified by the said server on the basis of information received via a network from a production facility of the said object". The portion of "on the basis of information received via a network from a production facility of the said object" only describes the source from which the server, separately from the robot apparatus, obtains information for specifying response information. This does not make any difference in the program itself of the robot apparatus, and does not serve to specify a structure, a function, etc., of the robot apparatus.

Consequently, there is no difference between the invention according to claim 1 and the invention disclosed in the cited document. As a result, the invention according to claim 1 lacks novelty.

Claim 2
Similarly, claim 2 to a robot apparatus recites a feature related to the server (the other sub-combination), namely, "the response information contains the attribute information and the unique identification information of each of the said object specified by the said server". With respect to the response information, claim 2 also specifies that the robot apparatus has "a control section storing a program which controls the operation of the robot apparatus on the basis of the received response information". Therefore, the robot apparatus according to claim 2 has a control section storing a program which controls the operation of the robot

apparatus on the basis of the attribute information and the unique identification information of each of the objects, and performs the operation, through the control section, in response to the attribute information and the unique identification information of each of the objects.

By contrast, in the disclosure in the cited document, "the response information is the information on a type of the said object specified by the said server". Therefore, the robot apparatus only has a control section with a program which controls the operation of the robot apparatus on the basis of the information on the type of the said object in the response information, and does not perform operation in response to the attribute information and the unique identification information of each of the objects.

Accordingly, there is a difference between the invention according to claim 2 and the invention disclosed in the cited document. As a result, the invention according to claim 2 is novel.

C. Inventive step

1. Case C-1

(From JPHB, Annex A, 5, Case 26)

Title of invention

Supply Chain Management Method

Claim 1

A computer implemented method for managing a supply chain, comprising the steps of:

— receiving a demand for a product;

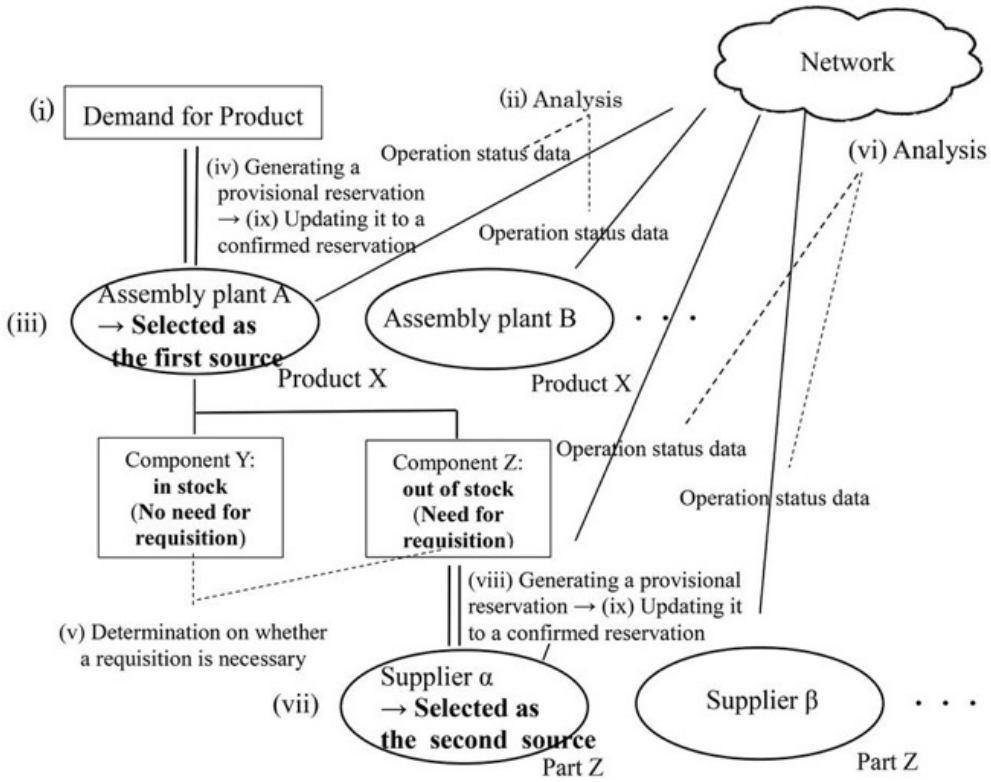
— selecting at least one first source(s) to satisfy the said demand, based on information including operation status data at a plurality of sources of the said product, and generating a provisional reservation for a supply from the selected source(s);

— determining whether there is a need for a requisition for any component part or material of the said product for the first source(s) to implement the said reservation;

— selecting, where it is determined that there is a need for the said requisition, at least one second source(s), from among a plurality of sources of the component part or material, to satisfy the requisition as a demand, based on information including operation status data at the sources, and generating a provisional reservation for a supply from the selected source(s); and

— updating the provisional reservations generated so far to confirmed reservations where, for each component part or material of the said product, it has been determined that the requisition is not necessary, or the provisional reservation has been generated.

Drawing in the application



Overview of the description

Problem to be solved by the invention

The present invention addresses the problem, in relation to supply chain management, of determining whether there is a need for a requisition for any component part or material of a product, and generating automatically using a computer a provisional reservation and a confirmed reservation in response to, inter alia, the operational status at a supply source where the requisition is necessary.

Solution for the problem to be solved

The method of the present invention selects at least one first source to satisfy a demand for a product in a supply chain, based on information including operation status data at a plurality of sources of the product. The operation status data may include real-time data at a production facility of a supplier (as a supply source) such as machine tool operation data and the amount of work waiting for processing, and the operation status data is utilised through communication via a network such as the internet. Analysis of the operation status data enables the selection of supply source(s) that reflects properly the supply capacity of each source from one moment to the next. Upon selection of at least one first source to satisfy the demand, the method generates, at this stage, "provisional reservation(s)" for supply from the selected source(s).

Next, the method determines whether there is a need for a requisition for any component part or material of the product. Where it is determined that there is a need for the requisition, at least one second source(s) is/are selected, from among a plurality of sources of the component part or material, to satisfy the requisition as a demand, based on information including operation status data. Such a process is iterated as necessary. Where, as a result, for each component part or material of the said product, it has been determined that the requisition is not necessary or otherwise the provisional reservation has been generated, the provisional reservations generated so far will be updated to confirmed reservations.

Accordingly, the method of the present invention is able to generate promptly provisional reservation(s), even in the case of a complicated supply chain with a number of tiers, and to find the status of insufficient supply in the supply chain, based on the existence of remaining provisional reservation(s), without them being updated to confirmed reservation(s), if any.

State of the art (prior art, well-known art, etc.)
Cited invention 1 (invention disclosed in cited document 1 (D1)):

— A computer implemented method for managing the supply and demand of a product, comprising the steps of:

— receiving a demand for a product;

— selecting a source to satisfy the said demand, based on information including operation status data at a plurality of sources of the said product;

— determining whether the said demand is satisfied by the supply from the said source; and

— selecting, where it is determined that the demand is not satisfied, another source to satisfy the unsatisfied demand, from among a plurality of sources of the said product, based on information including operation status data at the sources, or

— generating, where it is determined that the demand is satisfied, reservations for supply from the sources selected so far.

Cited invention 2 (invention disclosed in cited document 2 (D2)):

— A computer implemented method for assisting the inventory management of parts at a production facility, comprising the steps of:

— receiving a demand for a product;

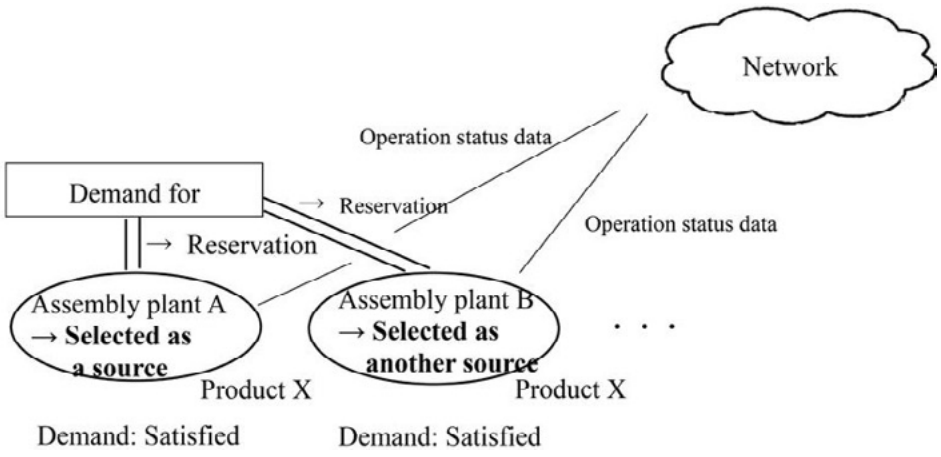
— identifying component parts necessary for manufacturing the said product;

— determining whether the stock of each component part is sufficient to satisfy the said demand;

— indicating, where it is determined that the stock is insufficient, possible source(s) of the said component part to satisfy the said demand and their supply capacity, based on information including operation status data at a plurality of sources of the said part, or

— indicating, where it is determined that the stock is sufficient, information regarding the said stock.

Drawing in D1



Conclusion (EPO)
Claim 1 lacks an inventive step.

Explanation (EPO)
Since the claimed subject-matter of this example is a computer-implemented method, it is not excluded from patentability under Article 52(2) and (3) EPC. However, when examining inventive step, at the EPO it must be assessed which features of a claim make a contribution to an inventive step.

All features of claim 1, apart from the fact of being computer-implemented method steps, relate to a non-technical administrative scheme for managing a supply chain, i.e. a method for doing business. However, the mere fact that subject-matter which is excluded per se under Article 52(2) EPC is technically implemented cannot form the basis for an inventive step. Inventive step can be based only on the particular manner of implementation of such subject-matter. To this end, it is therefore necessary to ask how the per se excluded subject-matter is implemented (see EPO Guidelines G-II, 3.3, "Technical implementations").

However, in this example, the claimed subject-matter does not go beyond a mere implementation of a business method. As such, claim 1 lacks an inventive step.

A lack of inventive step in such a case cannot be overcome by arguing that the claims, interpreted in the light of the description, exclude mere computer implementation of a business method. This would be tantamount to reading further technical features into the claim, a form of claim construction not allowable under the EPC and its case law.

Moreover, the present example may also be regarded as mere computer implementation of a mental activity. At the EPO, if a method claim does not exclude a purely mental realisation, it encompasses embodiments falling under the category of methods for performing mental acts as such (see EPO Guidelines G-II, 3.5.1).

This applies regardless of whether the claim encompasses technical embodiments too, and of whether the method is based on technical considerations. Again, mere implementation of a mental activity, an activity which is excluded as such, lacks an inventive step.

Conclusion (JPO)
The invention of claim 1 involves an inventive step.

Explanation (JPO)
The invention of claim 1 differs from cited invention 1 in the following respects.

Difference 1
While claim 1 recites a method for managing a supply chain comprising a step of determining whether there is a need for a requisition for any component part or material of a product, for the selected source(s) to implement the supply of the product, wherein the method selects, where it is determined that there is a need for the said requisition for the component part or material, at least one second source, from among a plurality of sources of the component part or material, to satisfy the requisition as a demand, based on information including operation status data at the sources, cited invention 1 is a method for managing the supply and demand of a product and does not take into account a requisition for any component part or material of the product.

Difference 2
While the method of claim 1 generates a "provisional reservation" for a supply from the selected source(s) and updates the "provisional reservations" generated so far to confirmed reservations where, for each component part or material of the said product, it has been determined that the requisition is not necessary or the "provisional reservation" has been generated, the method of cited invention 1 lacks features regarding the generation of a "provisional reservation" and the updating of such a "provisional reservation" to a confirmed reservation, although it generates reservations for supply from the selected sources.

Difference 1 will be considered.
Both D1 and D2 are directed to a method regarding the supply and demand management of a product, and therefore each field of technology is related to the other.

Furthermore, both D1 and D2 address the same problem of providing a computer-implemented method for the supply and demand management of a product, based on information including operation status data at a plurality of supply sources.

In this light, it would have been obvious to a person of ordinary skill in the art to apply D2 to D1, to take into account, other than the supply and demand management of a product itself, a requisition for a component part or material of the product for better supply and demand management, so as to manage a supply chain by incorporating in the method

the steps of determining whether there is a need for a requisition for any component part of a product and selecting, where it is determined that there is a need for the requisition for the component part, at least one second source from among a plurality of sources of the component part, to satisfy the requisition as a demand, based on information including operation status data at the sources.

Difference 2 will be considered.
D2, like D1, is silent about the features of claim 1 regarding the generation of a "provisional reservation" and the updating of such a "provisional reservation" to a confirmed reservation.

The method of claim 1 generates, upon the selection of one or more source(s) to satisfy the said demand for a product in the supply chain, a provisional reservation for a supply from the selected source(s), and then updates the generated provisional reservations to confirmed reservations where all the necessary provisional reservations for the supply chain have been generated. This enables the method of claim 1 to promptly generate provisional reservations, even in the case of a complicated supply chain with a number of tiers, and to find the status of insufficient supply in the supply chain, based on the existence of remaining provisional reservations, without them being updated to confirmed reservations, if any. The present functionality is considered to constitute an advantageous effect, which is not readily expected from D1 and D2.

As seen from the above analysis, the features of claim 1 regarding the generation of a "provisional reservation" and the updating of such a "provisional reservation" to a confirmed reservation cannot be deemed to be a design variation, etc. (namely, a design variation or design choice associated with an application of specific techniques to solve certain problems) practicable upon the application of D2 to D1.

Hence, claim 1 recites features disclosed neither in D1 nor D2 with an advantageous effect not readily expected from D1 and D2, from which it is concluded that the claimed invention involves an inventive step over D1 and D2.

2. Case C-2

(From JPHB, Annex B, Chap. 1, 3.3, Case 3-4)

Title of invention
Tree-Structured Area Management Data

What is claimed is:
Claim 1

— Tree-structured area management data comprising in the order of single-layer root node, multi-layer intermediate nodes and single-layer leaf nodes from the top, wherein;

— the said leaf nodes have location information on distribution areas and contents data associated with a plurality of angles;

— among the said intermediate nodes, those equipped with the said plurality of leaf nodes underneath have pointers to the said plurality of leaf nodes underneath and location information of the minimum bounding rectangle that bounds the said plurality of distribution areas corresponding to the plurality of leaf nodes underneath with the minimum area;

— among the said intermediate nodes, those equipped with a plurality of intermediate nodes underneath have pointers to the said plurality of intermediate nodes underneath and location information of the minimum bounding rectangle that bounds the said minimum bounding rectangle owned by the plurality of intermediate nodes underneath with the minimum area;

— the said root node has pointers to the said plurality of intermediate nodes underneath;

— wherein the tree-structured area management data is stored in a contents distribution server; and

— it is used by the said contents distribution server to perform processing to identify leaf nodes corresponding to distribution areas that geographically contain information on current location input as a search key in accordance with the pointers owned by a root node or intermediate nodes, and

— to identify contents data associated with an angle closest to angle information input as a search key among contents data owned by the said identified leaf nodes.

Drawings

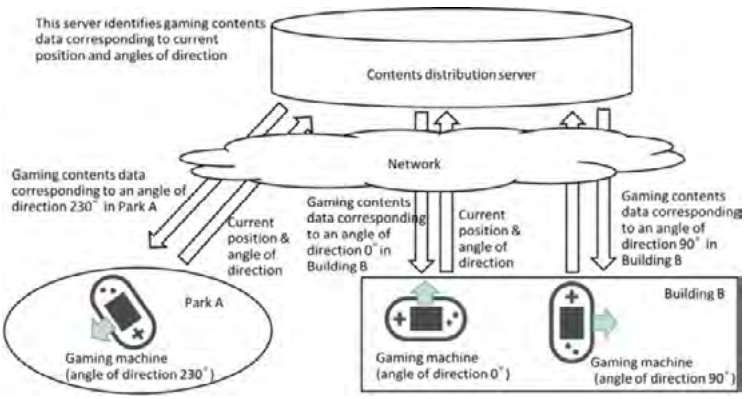


Figure 1

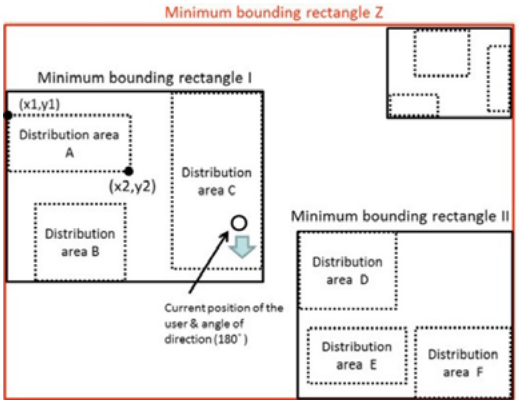


Figure 2

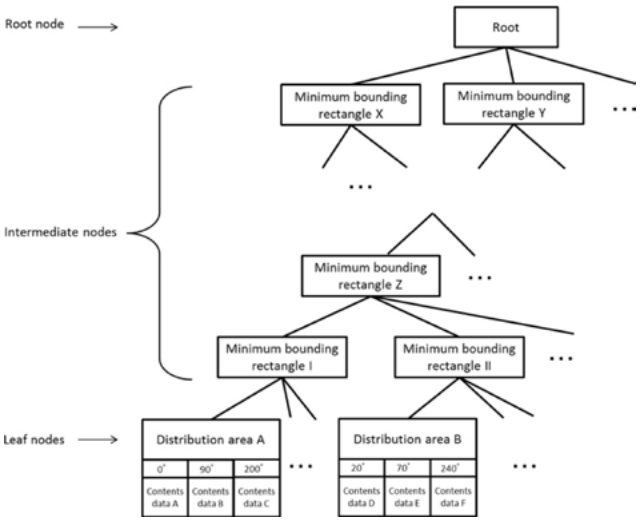


Figure 3

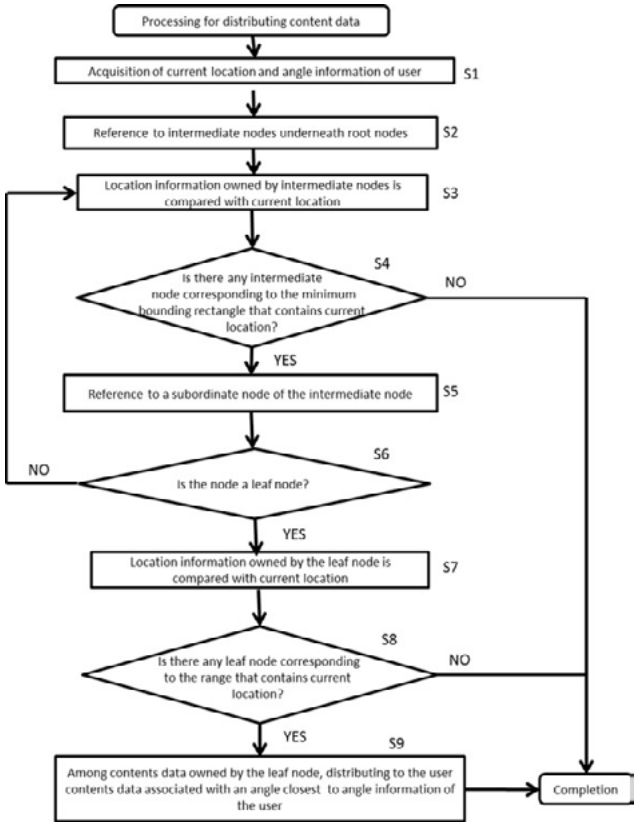


Figure 4

Overview of the description

Technical field

The present invention relates to a data structure for a technology to distribute contents data to users.

Background art

There is a service for users who own gaming machines that run on specific gaming applications within specific distribution areas on a map to distribute contents data on the game related to the distribution areas to their gaming machines. In this service, if a user is found to be in a specific distribution area while they are in transit, contents data related to the distribution area is automatically distributed to their gaming machine. Moreover, it is envisaged that the user physically moves to a specific distribution area where they may receive contents data in order to acquire desired data. Furthermore, a method is known in which an enormous number of distribution areas for this service is managed by a tree structure such that the present invention is designed in a way that processing to identify distribution areas that geographically contain the information on the current locations of users is carried out only by comparing the number of stages of the tree structure.

Problems to be solved by the invention

In order to further increase a game element of those applications, there is a method of distributing different contents data in accordance with the angles which users are facing even when they are in the same distribution area.

Solution for the problem to be solved

The present invention is characterised in that it associates a plurality of contents data by angle with one distribution area and stores such data. The present invention acquires from a gaming machine of a user, in addition to information on current location, angle information indicating a direction which the gaming machine is facing as a search key. In this way, when the user (gaming machine) is determined to be in a specific distribution area, contents data on the basis of the angle information of the gaming machine is distributed.

Description of the embodiments

As shown in the outline drawing of the present invention in Figure 1, the contents distribution server acquires the current location and angle information of users from their gaming machines as search keys, identifies distribution areas that geographically contain the current location information and distributes contents data associated with the angle from such data corresponding to the identified distribution areas to users. A gaming machine is equipped with a telecommunication function, current location acquisition function and a function to acquire information on the angle which the gaming machine is facing by the use of an angle sensor or by other means. An angle (0° to 360°) is measured in the clockwise direction on the basis of due north as 0°. Contents data includes items and characters used on gaming applications that run on those gaming machines. The contents distribution server manages distribution areas and contents data in a way that they are included in the tree-structured area management data as described below and stored in a memory part the server is equipped with.

Data structure of area management data

Each distribution area defines location information based on information on latitude and longitude (x1, y1) (x2, y2) in the diagonal location of the rectangle. A distribution area is bounded by one minimum bounding rectangle together with two or more distribution areas nearby. The minimum bounding rectangle refers to a rectangle that bounds a plurality of distribution areas with the minimum area and defines location information based on information on latitude and longitude in the diagonal location of the rectangle in the same manner as the distribution areas. A minimum bounding rectangle is bounded by a superordinate minimum bounding rectangle together with two or more minimum bounding rectangles nearby. In this way, tree-structured data composed of a plurality of distribution areas and minimum bounding rectangles is formed.

A root node is in the uppermost position of the data structure. A node corresponding to a minimum bounding rectangle is called an intermediate node, while a node corresponding to a distribution area is called a leaf node. A root node has pointers to a plurality of intermediate nodes underneath. Each of the intermediate nodes has location information on a corresponding minimum bounding rectangle and pointers to a plurality of subordinate intermediate nodes or leaf nodes. Each leaf node has location information on the corresponding distribution area and a plurality of contents data associated with a plurality of angles.

Figure 2 is an example of distribution areas and minimum bounding rectangles. The distribution areas A to C are bounded by minimum bounding rectangle I and the distribution areas D to F by minimum bounding rectangle II.

Figure 3 represents a structure of area management data formed in the case of Figure 2. The intermediate node corresponding to minimum bounding rectangle I has pointers to the leaf nodes corresponding to the distribution areas A to C, while that corresponding to minimum bounding rectangle II has pointers to the leaf nodes corresponding to the distribution areas D to F. The uppermost root node has pointers to

each of the intermediate nodes. Contents data by angle is associated with each of the leaf nodes.

Processing for distributing contents data

Figure 4 is used to explain the processing for distributing contents data performed by the contents distribution server. Once the server acquires information on the current location and angle information of a user from their gaming machine as a search key (S1), it refers to the intermediate nodes underneath the root node (S2) and compares location information owned by the intermediate nodes with the information on the current location (S3). Based on this comparison, it is determined whether or not there is any node corresponding to the minimum bounding rectangle that geographically contains the information on the current location (S4) and, if that is the case, subordinate nodes of the intermediate node are referred to (S5). If there is no such node, it is determined that there are no users in any of the distribution areas, and the processing completes and the processing for distributing contents data is not performed. Then, whether or not the subordinate nodes of the intermediate node are leaf nodes is determined (S6). If they are not leaf nodes, that is, if they are intermediate nodes, the process returns to (S3) and the processing described in (S3) to (S5) is repeated until those nodes reach a leaf node. If they are found to be leaf nodes, location information on the distribution areas owned by the leaf nodes and the information on the current location are compared (S7) to determine whether or not there is any leaf node corresponding to the distribution area that geographically contains the information on the current location (S8). If that is the case, among a plurality of contents data associated with angles owned by the leaf node, contents data associated with an angle closest to the angle information acquired from the user is distributed thereto (S9). On the other hand, if there is no corresponding leaf node, it is determined that there are no users in any of the distribution areas, and the processing completes and the processing for distributing contents data is not performed.

Specific processing for distributing contents data is shown using the examples in Figures 2 and 3. In these examples, a user exists in the distribution area C and is facing due south (180°). By repeating the process of comparing location information on distribution areas owned by the root node and intermediate nodes with the current location information, it is determined that the current location information is contained geographically in minimum bounding rectangle I. Then, location information on the distribution areas A to C owned by the subordinate leaf nodes underneath the intermediate node corresponding to minimum bounding rectangle I is compared with information on the current location to determine whether or not it is contained geographically in the distribution area C. Subsequently, among a plurality of contents data associated with angles owned by the leaf node corresponding to the distribution area C, contents data C associated with an angle (200°) closest to the angle information acquired from the user (180°) is distributed thereto.

As discussed here, by distributing the contents data based on angle information from the gaming machine, it becomes possible to distribute different contents data depending on the angles which users are facing, even if they are in the same area, thereby increasing the game element.

State of the art (prior art, well-known art, etc.)

Cited invention 1 (invention disclosed in cited document 1 (D1)):

— Tree-structured area management data comprising in the order of single-layer root node, multi-layer intermediate nodes and single-layer leaf nodes from top, wherein;

— the said leaf nodes have location information on distribution areas and contents data;

— among the said intermediate nodes, those equipped with the said plurality of leaf nodes underneath have pointers to the said plurality of leaf nodes underneath and location information having a minimum bounding rectangle that bounds the said plurality of distribution areas corresponding to the plurality of leaf nodes underneath with the minimum area;

— among the said intermediate nodes, those equipped with a plurality of intermediate nodes underneath have pointers to the said plurality of intermediate nodes underneath and location information having the minimum bounding rectangle that bounds the said minimum bounding rectangles owned by the plurality of intermediate nodes underneath with the minimum area;

— the said root node has pointers to the said plurality of intermediate nodes underneath;

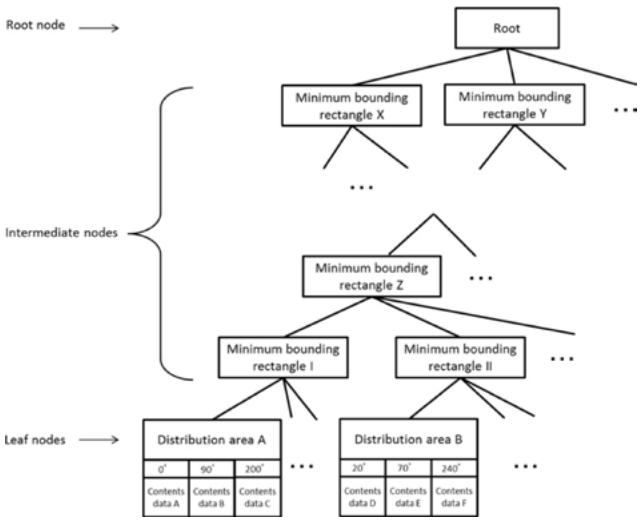
— wherein the tree-structured area management data is stored in a contents distribution server; and

— it is used by the said contents distribution server to perform processing to identify leaf nodes corresponding to distribution areas that geographically bound current location information input as a search key in accordance with the pointers owned by root node or intermediate nodes.

Problems to be solved

To identify at high speed the unique contents data corresponding to the current location information by identifying at high speed distribution areas that geographically contain the said current location information of users input as a search key.

Drawing in D1



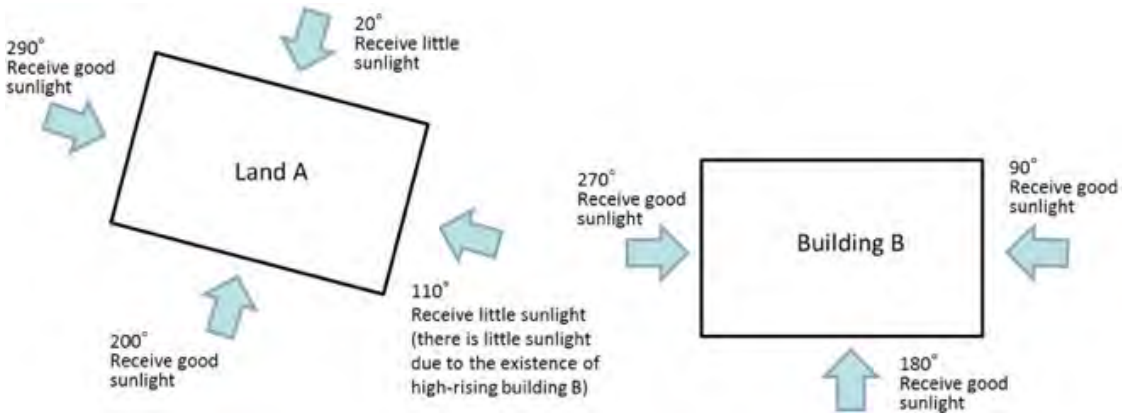
Drawing in D2

Land A (positional information X)			
20°	110°	200°	290°
Receive little sunlight	Receive little sunlight	Receive good sunlight	Receive good sunlight

Building B (positional information Y)		
90°	180°	270°
Receive good sunlight	Receive good sunlight	Receive good sunlight

...

Example of data



Example of display on a map

Cited invention 2 (invention disclosed in cited document 2 (D2)):

The second cited invention discloses data comprising location information indicating a location on a map of a geographical area, angle information indicating the geographical area's surface at said location, and sunlight information indicating the condition of sunlight in the geographical area by angles. This data is processed, for displaying a map of the said geographical area on a computer display by associating the said sunlight information with the said angle information.

Problems to be solved

When a geographical area is displayed on a map, sunlight information by angle relating to the geographical area is displayed.

Conclusion (EPO)
On the assumption that claim 1 essentially refers to a data structure, the invention of claim 1 involves an inventive step.

Explanation (EPO)
According to EPO Guidelines G-II, 3.6.3, a computer-implemented data structure embodied on a medium has technical character. In this example, the claim defines tree-structured area management data, including its structure, and further comprises a limitation to the fact that the data is stored in a contents distribution server. The subject-matter defined by claim 1 is thus an invention within the meaning of Article 52(2) and (3) EPC.

Moreover, the data structure of the claim is defined in terms which inherently comprise the technical features of the contents distribution server in which it is used. In other words, the claim defines functional data, the features of which make a contribution to an inventive step.

Regarding inventive step, D2 tackles the problem of a more realistic 3D display taking into consideration angle values relevant to sunlight information. For this purpose, D2 uses a tree data structure, storing said sunlight-relevant information in the leaf nodes.

By contrast, claim 1 tackles the problem of more efficient retrieval and distribution of contents data relevant to game player viewing angles.

Therefore, even if angle information stored in a tree data structure plays a role in both D2 and claim 1, the angle information in each case has a different origin and serves a different purpose (in claim 1, orientation of the game player; in D2 sunlight angles). Therefore, the skilled person faced with the problem posed, and in knowledge of D2, would not be prompted to implement the sunlight angle adaptation technique of D2 in the game player orientation case of the present invention. An inventive step can thus be acknowledged.

Conclusion (JPO)
The invention of claim 1 involves an inventive step.

Explanation (JPO)
When the invention of claim 1 and cited invention 1 are compared, they are different in the following respect.

Difference
The leaf node of area management data claimed in the invention of claim 1 has a plurality of contents data by angle associated with location information on a rectangular distribution area and a plurality of angles and is used for processing to identify a leaf node corresponding to a distribution area that geographically contains the information on the current location input as a search key and to identify contents data associated with an angle closest to the angle information input as a search key. On the other hand, the leaf node of area management data claimed in cited invention 1 has location information of a rectangular distribution area and one set of contents data and is used only for processing to identify contents data associated with a leaf node corresponding to a distribution area that geographically contains the information on the current location input as a search key. However, it does not have contents data by angle, nor is it used for processing to identify contents data associated with an angle closest to the angle information input as a search key.

The above difference will be considered.

(1) Relation of technical fields
Cited invention 1 and cited invention 2 have a common technical field in that both of them relate to a technology to manage information on geographical areas.

(2) Similarity of problems to be solved
The problem to be solved by cited invention 1 is, by identifying at high speed a distribution area that geographically contains the information on the current location of a user input as a search key, to identify at high speed the unique contents data corresponding to the said information on the current location, while the problem to be solved by cited invention 2 is, when a geographical area is displayed on a map, to display specific information by angle with respect to the said geographical area. Therefore, the problems to be solved by the two inventions are not similar.

(3) Similarity of operations or functions
Cited invention 1 is tree-structured data and used for processing, by identifying at high speed a distribution area that geographically contains the information on the current location of a user input as a search key, to identify at high speed the unique contents data corresponding to the said information on the current location, through

information processing in accordance with pointers owned by the root nodes and intermediate nodes. On the other hand, cited invention 2 is data with which the surface angles of specific geographical areas are associated with sunlight information for processing to display a map. However, the data is not used for processing to identify information based on an input search key. Thus, the two inventions do not have operations or functions in common.

When considering the circumstances described from (1) to (3) above (considered motivation) comprehensively, it is not determined that there is a motivation to apply cited invention 2 to cited invention 1.

Moreover, an effect claimed in the invention of claim 1 that the leaf node of area management data has a plurality of contents data by angle associated with a plurality of angles, such that different contents data may be distributed depending on the angle which users are facing, even if they are in the same area, is advantageous and not predicted based on cited invention 1 or cited invention 2.

When taking the above circumstances into consideration comprehensively, it is not determined that a person skilled in the art could have easily arrived at the invention of claim 1 on the basis of cited invention 1 and cited invention 2.

3. Case C-3

(From EPO Guidelines G-VII, 5.4.2.1, Example 1)

Title of invention
Method of facilitating shopping on a mobile device

What is claimed is:
Claim 1
Method of facilitating shopping on a mobile device wherein:

(a) the user selects two or more products to be purchased;

(b) the mobile device transmits the selected products data and the device location to a server;

(c) the server accesses a database of vendors to identify vendors offering at least one of the selected products;

(d) the server determines, on the basis of the device location and the identified vendors, an optimal shopping tour for purchasing the selected products by accessing a cache memory in which optimal shopping tours determined for previous requests are stored; and

(e) the server transmits the optimal shopping tour to the mobile device for displaying.

Overview of the description
(Omitted)

State of the art (prior art, well-known art, etc.)

Cited invention 1 (invention disclosed in cited document 1 (D1)):
A method for facilitating shopping on a mobile device wherein the user selects a single product and the server determines from a database the vendor selling the selected product nearest to the user and transmits this information to the mobile device.

Cited invention 2 (invention disclosed in cited document 2 (D2)):
A travel planning system for determining travel trips, listing a set of places to visit, wherein the system accesses for the sake of efficiency a cache memory storing results of previous queries.

Conclusion (EPO)
The invention of claim 1 does not involve an inventive step.

Explanation (EPO)
Application of the steps of the problem-solution approach according to EPO Guidelines G-VII, 5.4:

Step (i): The features contributing to the technical character are prima facie identified as a distributed system comprising a mobile device connected to a server computer which has a cache memory and is connected to a database.

Step (ii): Document D1, which discloses a method for facilitating shopping on a mobile device wherein the user selects a single product and the server determines from a database the vendor selling the selected product nearest to the user and transmits this information to the mobile device, is selected as the closest prior art.

Step (iii): The differences between the subject-matter of claim 1 and D1 are:

(1) The user can select two or more products to purchase (instead of a single product only).

(2) An "optimal shopping tour" for purchasing the two or more products is provided to the user.

(3) The optimal shopping tour is determined by the server

by accessing a cache memory in which optimal shopping tours determined for previous requests are stored.

Differences (1) and (2) represent modifications of the underlying business concept since they define producing an ordered list of shops to visit which sell these products. No technical purpose is served, and no technical effects can be identified from these differences. Hence, these features make no technical contribution over D1. On the other hand, difference (3) makes a technical contribution as it relates to the technical implementation of differences (1) and (2) and has the technical effect of enabling rapid determination of the optimal shopping tour by accessing previous requests which are stored in a cache memory.

Step (iii)(c): The objective technical problem is to be formulated from the perspective of the person skilled in the art as an expert in a technical field. Such a person is not deemed to have any expertise in business-related matters. In the present case, they can be defined as an expert in information technology who gains knowledge of the business-related features (1) and (2) as part of the formulation of the technical problem to be solved, as would be the case in a realistic situation in the form of a requirement specification. The objective technical problem is thus formulated as how to modify the method of D1 to implement in a technically efficient manner the non-technical business concept defined by the differences (1) and (2), which is given as a constraint to be met.

Obviousness: Following requirement (1), it would have been a matter of routine for the skilled person to adapt the mobile device used in D1 so as to enable the user to select two or more products instead of a single one. It would also have been obvious to assign the task of determining the optimal shopping tour (arising from requirement (2)) to the server, by analogy with the server likewise determining the nearest vendor in D1. Since the objective technical problem further requires a technically efficient implementation, the skilled person would have looked for efficient technical implementations of the determination of a tour. A second document D2 discloses a travel planning system for determining travel trips, listing a set of places to visit, and addresses this technical problem: the system of D2 accesses for this purpose a cache memory storing results of previous queries. The skilled person would thus have considered the teaching of D2 and adapted the server in D1 to access and use a cache memory as suggested in D2 so as to provide a technically efficient implementation of the determination of the optimal shopping tour, i.e. difference (3). Hence, no inventive step is involved within the meaning of Articles 52(1) and 56 EPC.

Remarks: The example shows a typical application of the approach developed in T 641/00 (COMVIK). The analysis of technical effects is performed in detail at step (iii) to see if the differences from the closest prior art comprise features making a technical contribution. This analysis refines the initial finding of step (i) by identifying the feature of accessing the cache memory for results of previous requests in the step of determining the tour as a technical feature. Note that in this case step (i) would not need to be indicated explicitly in the reasoning. In step (iii)(c), the non-technical modifications to the business concept are given to the skilled person as a constraint to be met. Whether or not the new business concept is innovative is irrelevant here for the assessment of inventive step, which has to be based on the features of its technical implementation.

Conclusion (JPO)
The invention of claim 1 involves an inventive step.

Explanation (JPO)
When the invention of claim 1 and cited invention 1 are compared, they differ in the following respects.

Difference 1
In the invention of claim 1, the number of products that the user selects is "two or more", and the server accesses "a database of vendors" and identifies "vendors offering at least one" of the selected products, on the basis of which the optimal shopping tour is determined. On the other hand, in cited invention 1, the number of products that the user selects is "single", and the server accesses an unspecified database to determine "the vendor nearest to the user".

Difference 2
In the invention of claim 1, the server "determines, on the basis of the device location and the identified vendors, an optimal shopping tour for purchasing the selected products by accessing a cache memory in which optimal shopping tours determined for previous requests are stored". On the other hand, cited invention 1 only recites that the server determines the vendor nearest to the user but recites nothing about determining such an "optimal shopping tour".

For the sake of convenience, difference 2 will be considered first.

The "optimal shopping tour" of the invention of claim 1 is determined after the server has identified vendors in step (c). Accordingly, it is natural to interpret it as the optimal route according to which the user visits the vendors in this order.

On the basis of this consideration, cited invention 2 will be

considered. Cited invention 2 is an invention about a travel planning system, and only recites that a set of places to visit are listed and results of previous queries are stored in a cache memory, so that the system can access them. Thus, it cannot be said that cited invention 2 involves the concept of the optimal tour for visiting the listed places and that cited invention 2 contains any recitation about storing in a cache memory optimal tours for visiting the places in the optimal order.

When common technical knowledge is considered for "a set of places to visit", it may be possible to suppose that cited invention 2 recites that optimal tours for visiting the places are stored in a cache memory, but applying this recitation to cited invention 1 to arrive at the matter of the invention of claim 1 described concerning difference 2 would have required a motivation to do so. However, cited invention 1 does not involve the concept of a shopping tour for visiting vendors in an optimal way. Furthermore, even if cited invention 1 is capable of identifying two or more vendors, it would be natural to interpret that the server determines the respective vendors selling the respective products nearest to the user. In this way, cited invention 1 does not inherently have the problem to be solved of visiting the vendors in the optimal way in the shopping tour, and cited invention 1 and cited invention 2 do not have a common problem to be solved. Moreover, between cited invention 1 and cited invention 2, there is no commonality in terms of technical fields or functions which could have been a motivation for applying cited invention 2 to cited invention 1.

Then, since cited invention 1 and cited invention 2 do not have the concept of optimal tours or, even if cited invention 2 has the concept of optimal tours, there is no motivation to apply cited invention 2 to cited invention 1.

Furthermore, because of the matter described concerning difference 2, the invention of claim 1 involves an advantageous effect in that it can present the user with an optimal shopping tour for visiting vendors.

Thus, it cannot be said that the person skilled in the art could have arrived at the matter of the invention of claim 1 described concerning difference 2 by applying cited invention 2 to cited invention 1.

Next, difference 1 will be considered.

As was discussed in difference 2 above, cited invention 1 does not involve the concept of a shopping tour for visiting vendors in an optimal way. Furthermore, even if cited invention 1 was capable of identifying two or more vendors, it would be natural to interpret that the server determines the respective vendors selling the respective products nearest to the user. Accordingly, even if in cited invention 1 the user can select two or more products, it cannot be said that the person skilled in the art could have easily arrived at the idea of identifying "vendors offering at least one" of the selected products on the basis of which the server determines the optimal shopping tour.

Furthermore, because of the matter described concerning difference 1, the invention of claim 1 involves an advantageous effect in that vendors required to determine the optimal shopping tour can be identified.

When taking the above circumstances into consideration comprehensively, it is not determined that a person skilled in the art could have easily arrived at the invention of claim 1 on the basis of cited invention 1 and cited invention 2.

4. Case C-4

(From EPO Guidelines G-VII, 5.4.2.2, Example 2)

Title of invention

A computer-implemented method for brokering offers and demands in the field of transporting freight

Claim 1

A computer-implemented method for brokering offers and demands in the field of transporting freight, comprising the following steps:

(a) receiving transportation offers/demands from users, including location and time data;

(b) receiving current location information of the users from GPS terminals with which the users are equipped;

(c) after receiving a new offer/demand request, verifying if there are previous offers/demands not yet satisfied that can respond to the new request;

(d) if so, selecting the one for which the current locations of both users are closest; and

(e) otherwise storing the new request.

Overview of the description
(Omitted)

State of the art (prior art, well-known art, etc.)
Cited invention 1 (invention disclosed in cited document 1 (D1)):

A method of order management in which a server computer receives location information from GPS terminals.

Conclusion (EPO)
The invention of claim 1 does not involve an inventive step.

Explanation (EPO)
Application of the steps of the problem-solution approach according to EPO Guidelines G-VII, 5.4:

Step (i): Underlying the claimed method is the following business method:

A method for brokering offers and demands in the field of freight transportation, comprising:

(a) receiving transportation offers/demands from users, including location and time data;

(b) receiving information regarding the current location of the users;

(c) after receiving a new offer/demand request, verifying if there are previous offers/demands not yet satisfied that can respond to the new request;

(d) if so, selecting the one for which the current locations of both users are closest; and

(e) otherwise storing the new request.

Such a business method is per se non-technical and excluded under Article 52(2)(c) and (3) EPC. Brokering offers and demands is a typical business activity. Using the geographical location of users is the kind of criterion which a transportation broker could specify as part of a business method based on non-technical, business considerations only. This business method does not serve any technical purpose in the context of the invention and thus does not contribute to its technical character.

Therefore, only the features related to the technical implementation of this business method can be identified as the features contributing to the technical character of the invention:
— The business method steps are carried out by a computer.
— The current location information is received from GPS terminals.

Step (ii): As a suitable starting point, document D1, which discloses a method of order management in which a server computer receives location information from GPS terminals, is selected as the closest prior art.

Step (iii): The difference between the subject-matter of claim 1 and D1 is thus the computer implementation of the steps of the business method defined above.

The technical effect of this difference is merely the automation of the business method underlying claim 1. The conclusion reached in step (i) holds, since the only distinguishing feature making a technical contribution is the technical implementation of this business method.

Step (iii)(c): The objective technical problem is formulated as how to adapt the method of D1 so as to implement the business method of brokering offers and demands according to the user's current location. The person skilled in the art is considered to be a software project team and is given the knowledge of the business method in the form of a requirement specification.

Obviousness: Adapting the method of D1 to execute the business method steps is straightforward and requires routine programming only. Therefore, no inventive step is involved within the meaning of Articles 52(1) and 56 EPC.

Remarks: In this example, it was clear from the initial analysis at step (i) that underlying the claimed method was a method for brokering offers and demands, which as such is a business method. The features defining the business method were easily separable from the technical features of its computer implementation. Therefore, this example illustrates a line of argument in which it was possible in step (i) to determine all the features which contribute to the technical character of the invention and all those which do not. This line of argument pertains more to the field of computer-implemented business methods and might be less suitable in other fields.

Conclusion (JPO)
The invention of claim 1 involves an inventive step.

Explanation (JPO)
When the invention of claim 1 and cited invention 1 are compared, they differ in the following respect.

Difference
The invention of claim 1 is directed to a computer-implemented method for brokering offers and demands in the field of transporting freight, comprising the following steps of:

(a) receiving transportation offers/demands from users, including location and time data;

(c) after receiving a new offer/demand request, verifying if there are previous offers/demands not yet satisfied that can respond to the new request;

(d) if so, selecting the one for which the current locations of both users are closest; and

(e) otherwise storing the new request,

whereas in the cited invention 1 a concrete method of order management is not clearly discclosed except that a server computer receives location information from GPS terminals.

The difference will be considered.

For a computer-implemented method for brokering offers and demands in the field of transporting freight, there is no prior art which suggests inclusion of the steps defined as (a), (c) to (e). Also, there are no grounds sufficient to support the discussion that the inclusion of the said steps can be deemed to be a design variation, etc. (namely, a design variation or design choice associated with an application of specific techniques to solve certain problems) of cited invention 1.

Furthermore, because of the matter described concerning the difference, the invention of claim 1 involves an advantageous effect over cited invention 1 in that it provides a specific method for brokering offers and demands in the field of transporting freight, which has not been realised, is realised by a computer.

When taking the above circumstances into consideration comprehensively, it is not determined that a person skilled in the art could have easily arrived at the invention of claim 1 on the basis of cited invention 1.

5. Case C-5

(From EPO Guidelines G-VII, 5.4.2.3, Example 3)

Title of invention

A system for the transmission of a broadcast media channel to a remote client over a data connection

Claim 1

A system for the transmission of a broadcast media channel to a remote client over a data connection, said system including:

(a) means for storing an identifier of the remote client and an indication of an available data rate of the data connection to the remote client, said available data rate being lower than the maximum data rate for the data connection to the remote client;

(b) means for determining a rate at which data is to be transmitted based on the indication of the available data rate of the data connection; and

(c) means for transmitting data at the determined rate to said remote client.

Overview of the description

Under some pricing models, a customer may choose to pay a lower amount and receive a lower bit rate service when their line is capable of receiving a higher rate. Accordingly, the quality made available to the customer is preferably determined by the quality of service purchased and not necessarily the maximum quality available over the line.

State of the art (prior art, well-known art, etc.)

Cited invention 1 (invention disclosed in cited document 1 (D1)):

— A system for broadcasting video over an xDSL connection to the set-top boxes of subscribers, the said system comprising;

— a database storing identifiers of subscribers' computers and, in association with them, an indication of the maximum data rate for the data connection to each subscriber's computer; and

— means for transmitting the video to a subscriber's computer at the maximum data rate stored for said computer.

Conclusion (EPO)
The invention of claim 1 does not involve an inventive step.

Explanation (EPO)
Application of the steps of the problem-solution approach according to EPO Guidelines G-VII, 5.4:

Step (i): All features are prima facie identified as technical.

Step (ii): Document D1, which discloses a system for broadcasting video over an xDSL connection to the set-top boxes of subscribers, is selected as the closest prior art. The system comprises a database storing identifiers of subscribers' computers and, in association with them, an indication of the maximum data rate for the data connection to each subscriber's computer. The system further comprises means for transmitting the video to a subscriber's computer at the maximum data rate stored for said computer.

Step (iii): The differences between the subject-matter of claim 1 and D1 are:

(1) Storing an indication of an available data rate of the data connection to the remote client, said available data rate being lower than the maximum data rate for the data connection to the remote client.

(2) Using said available data rate to determine the rate at which the data is transmitted to the remote client (instead of transmitting the data at the maximum data rate stored for said remote client as in D1).

In order to determine if any technical effects arise from these differences, the following disclosure of the description is taken into account:

Under some pricing models, a customer may choose to pay a lower amount and receive a lower bit rate service when their line is capable of receiving a higher rate. Accordingly, the quality made available to the customer is preferably determined by the quality of service purchased and not necessarily the maximum quality available over the line.

The feature of "available data rate being lower than a maximum data rate for the data connection to the remote client" is the result of a technical implementation of a pricing model which allows a customer to choose from several data rates, each rate being associated with a corresponding level of quality of service and being priced accordingly. This pricing model is itself non-technical, being of a financial, administrative or commercial nature and thus falling under the exclusion of schemes, rules and methods for doing business in Article 52(2)(c) EPC. Thus, the only technical effect achieved is determining the transmission data rate in accordance with the pricing model. The pricing model itself represents an aim to be achieved in a non-technical field which may be included in the formulation of the objective technical problem as a constraint to be met.

Step (iii)(c): The objective technical problem is therefore formulated as how to implement in the system of D1 a pricing model which allows the customer to choose to pay a lower amount to receive broadcast media channels at a quality of service lower than the highest possible quality of service (i.e. at a data rate lower than the maximum possible data rate of the data connection). The pricing model is considered to be provided to the skilled person as part of the objective technical problem.

Obviousness: Given the task of implementing this pricing model, it would be obvious to the skilled person that the maximum data rate purchased by a subscriber (i.e. the "available data rate" of claim 1), which can only be lower or equal to the maximum data rate of the data connection to the subscriber's computer (i.e. the "remote client" of claim 1), would have to be stored for each subscriber and used by the system to determine the rate at which data is to be transmitted to a subscriber. Therefore, no inventive step is involved within the meaning of Articles 52(1) and 56 EPC.

Remarks: This example illustrates a claim which involves a complex mix of technical and non-technical features. On a prima facie basis in step (i), all features appeared to be technical. After comparison with D1, a detailed analysis of the technical character of the contribution made by the invention over D1 was possible at step (iii). This detailed analysis revealed that the purpose of transmitting data at a rate based on a pre-stored available data rate, lower than the maximum data rate for the data connection, was not technical but commercial. Since the contribution over D1 was the technical implementation of a non-technical concept (pricing model), incorporating this non-technical concept in the formulation of the objective technical problem, as in T 641/00, was particularly appropriate.

Conclusion (JPO)
The invention of claim 1 involves an inventive step.

Explanation (JPO)
When the invention of claim 1 and cited invention 1 are compared, they differ in the following respect.

Difference
The data rate, which is stored with an identifier of a remote

client and is a basis for determining a rate at which data is to be transmitted to the remote client, is lower than the maximum data rate for the data connection to the remote client in the invention of claim 1, whereas the data rate is the maximum data rate for the data connection to the remote client in cited invention 1.

The difference will be considered.

For a system for the transmission of a broadcast media channel to a remote client over a data connection, there is no prior art which suggests the feature that the data rate, which is stored with an identifier of a remote client and is a basis for determining a rate at which data is to be transmitted to the remote client, is lower than the maximum data rate for the data connection to the remote client. Also, there are no grounds sufficient to support the discussion that determining the data rate in the above manner can be deemed to be a design variation, etc. (namely, a design variation or design choice associated with an application of specific techniques to solve certain problems) of cited invention 1.

Moreover, because of the matter described concerning the difference, the invention of claim 1 involves an advantageous effect over cited invention 1 in that it constitutes a system which makes it possible to arbitrarily set a data rate lower than the maximum data rate for the data connection to each remote customer using the identifier of the remote customer. Furthermore, it can also be inferred that the system has the effect of reducing error and congestion in data transmission.

When taking the above circumstances into consideration comprehensively, it is not determined that a person skilled in the art could have easily arrived at the invention of claim 1 on the basis of cited invention 1 and cited invention 2.

6. Case C-6

(from JPHB, Annex A, Chap. 5, Case 34)

Title of invention

Estimation system of hydroelectric generating capacity

What is claimed is:

Claim 1

An estimation system of a hydroelectric power generating capacity of a dam comprising:

— a neural network that is built by means of an information processor, the neural network having an input layer and an output layer, in which an input data to the input layer containing a precipitation amount of the upper stream of a river, a water flow rate of the upper stream of the river, and a water inflow rate into a dam during a predetermined period between a reference time and a predetermined time before the reference time, and an output data from the output layer containing a hydroelectric power generating capacity in the future after the reference time;

— a machine learning unit that trains the neural network using a training data corresponding to actual values of the input data and the output data; and

— an estimation unit that inputs the input data to the neural network that has been trained by the machine learning unit with setting a current time as the reference time, and then calculates an estimated value of a future hydroelectric power generating capacity based on the output data of which reference time is the current time.

Claim 2

The estimation system of a hydroelectric power generating capacity as in Claim 1, wherein the input data to the input layer further contains a temperature of the upper stream of the river during the predetermined period between the reference time and the predetermined time before the reference time.

Overview of the description

Background art

Hydroelectric power-generating capacity in the future is estimated by a dam operator by estimating a water inflow rate into a dam in the future based on a previous precipitation amount of the upper stream of the river, a water flow rate of the upper stream of the river and the like, and then converting the estimated water inflow rate into hydroelectric power-generating capacity.

Problem to be solved by the invention

Generally, hydroelectric power-generating capacity in the future is estimated based on a precipitation amount of the upper stream of the river, a water flow rate of the upper stream of the river and an actual water inflow rate into a dam within the past few weeks. In many cases, dam operators make a function to calculate a water inflow rate in the future based on such data; input data that was obtained at certain times within the past few weeks to the function; and then convert the estimated water inflow rate into hydroelectric power-generating capacity.

In this method, however, operators have to make a function for each dam. Then, a water inflow rate in the future should be calculated using this function and converted into hydroelectric power-generating capacity in an approximate way. As a result, hydroelectric power-generating capacity cannot be estimated with high accuracy even if operators precisely modify a function itself.

In view of such a problem, it is an object of the present invention to provide an estimation system for hydroelectric power-generating capacity that can directly estimate hydroelectric power-generating capacity with high accuracy.

Means for solving the problem

According to the invention of claim 1, a neural network is trained through supervised machine learning using training data. The training data includes input data containing a precipitation amount of the upper stream of a river, a water flow rate of the upper stream of the river and a water inflow rate into a dam during a predetermined period between a reference time and a predetermined time before the reference time, and output data containing hydroelectric power-generating capacity in the future after the reference time. In response to an input to the trained neural network of a precipitation amount of the upper stream of a river, a water flow rate of the upper stream of the river and a water inflow rate into a dam before the current time, hydroelectric power-generating capacity in the future is estimated.

According to the invention of claim 2, the input data further includes a temperature of the upper stream of the river during a predetermined period between a reference time and a predetermined time before the reference time.

Effects of the invention

According to the invention of claim 1, hydroelectric power-generating capacity in the future can be directly estimated with high accuracy using a trained neural network.

According to the invention of claim 2, a temperature of the upper stream of the river is added to the input data. It allows a highly accurate estimation of actual hydroelectric power-generating capacity all year round, including in the spring with low precipitation. It has so far not been considered that there is a correlation between hydroelectric power-generating capacity and a temperature of the upper stream of the river. However, it is possible to achieve a more accurate estimation taking an increase of inflow rate due to meltwater into consideration, by using input data containing a temperature too.

State of the art (prior art, well-known art, etc.)

Cited invention 1 (invention disclosed in cited document 1 (D1)):

An estimation system of a hydroelectric power generating capacity that carries out a multiple regression analysis by an information processor, comprising:

— a regression equation model, in which explanatory variables are a precipitation amount of the upper stream of a river, a water flow rate of the upper stream of the river, and a water inflow rate into a dam during a predetermined period between a reference time and a predetermined time before the reference time, and an objective variable is a hydroelectric power generating capacity in the future after the reference time;

— an analysis unit that calculates a partial regression coefficient of the regression equation model based on actual values corresponding to the explanatory variables and the objective variable; and

— an estimation unit that, into the regression equation model to which the partial regression coefficient that has been calculated by the analysis unit is set, inputs data of the explanatory variables with setting a current time as the reference time, and then, calculates an estimated value of a future hydroelectric power generating capacity based on an output data from the objective variable setting a current time as the reference time.

Well-known art

In the technical field of machine learning, it is well known that an estimation process of an output in the future is carried out based on an input of time series data in the past, by using a neural network which has been trained with data containing an input of time series data in the past and a certain output in the future.

EPO analysis

Both claims define a system that is implemented by means of an information processor. According to the any-technical-means approach adopted by the EPO, the subject-matter defined by the claims is thus not excluded under Article 52(2) and (3) EPC, i.e. it is regarded as an invention within the meaning of Article 52(1) EPC.

An estimation system similar to the one defined in claim 1 is known from the prior art. The system of claim 1 essentially differs from this prior art in that another mathematical model is employed, namely a trained neural network instead of a regression analysis model.

According to EPO Guidelines G-II, 3.3.1, artificial intelligence and machine learning neural networks are regarded as mathematical methods which, when claimed as such, are considered to lack technical character. However, when assessing the contribution made by a neural network to the technical character of an invention, it must be taken into account whether, in the context of the invention, the neural network serves a technical purpose and/or is adapted to a specific technical implementation.

The input parameters to the system of claim 1 are: a series of precipitation amount values of the upper stream of a river, the water flow rate of the upper stream of the river and the water inflow rate into a dam. These input parameters are processed by the trained neural network to provide predicted hydroelectric power-generating capacity.

Hydroelectric power generation is a technical process. The provision of information about a specific technical process by processing related physical measurements is considered a technical effect. It follows that the trained neural network serves a technical purpose and thereby contributes to the technical character of the system defined by claim 1. As such, all features of the claimed system need to be taken into account in the assessment of inventive step.

The trained neural network serves exactly the same technical purpose as the regression analysis model used by the system known from the prior art. Therefore, the subject-matter of claim 1 solves the objective technical problem of how to predict hydroelectric power-generating capacity in an alternative manner. In this context, it is noted that, as compared to using a regression analysis for the prediction task, utilising a neural network has the advantage of foregoing the need for an accurate system model.

In relation to this objective technical problem, it is common general knowledge of the skilled person that predicting a parameter based on past time series data can be implemented by first training a neural network with that data and then applying the trained neural network to make the prediction. Therefore, it is obvious to the skilled person to use a trained neural network instead of the regression equation model for solving the objective technical problem. By replacing the regression equation model with a neural network and a corresponding training mechanism, the skilled person arrives at the claimed system in an obvious manner. Consequently, the subject-matter of claim 1 does not involve an inventive step within the meaning of Article 56 EPC.

The system of dependent claim 2 comprises an additional feature, namely that the data input to the input layer further contains a temperature of the upper stream of the river during the predetermined period between the reference time and the predetermined time before the reference time.

The description of claim 2 teaches that:
It has not been considered that there is a correlation between a hydroelectric power generating capacity and a temperature of the upper stream of the river, so far. However, it is possible to achieve a more accurate estimation taking an increase of inflow rate due to meltwater into consideration, with the use of an input data further containing a temperature.

For the purpose of assessing the inventive step of claim 2, it is assumed that the description properly reflects the state of the art. On this assumption, the system of claim 2 additionally differs from the state of the art in that it trains the neural network and subsequently makes a prediction on the basis of additional input data correlated with hydroelectric power-generating capacity, namely temperature data of an upper stream of a river feeding into a dam. Since the skilled person knows from common general knowledge that properly trained neural networks are generally suitable for making predictions by exploiting correlations between data, it is plausible that the additional features of claim 2 contribute to solving a technical problem. In particular, since the temperature data is correlated with an increase in the inflow rate due to meltwater, the claimed system can estimate hydroelectric power-generating capacity of a dam more accurately than known systems. In view of the state of the art, which neither teaches nor hints at exploiting this type of correlation, the system of claim 2 is not obvious to the person skilled in the art, and an inventive step can be acknowledged (Article 56 EPC). Note, however, that the disclosure of the invention must enable the skilled person to reproduce the invention as claimed. If, as is the case here, the training is essential for imparting a technical function to a neural network, insufficient disclosure of the training will result in an objection under Article 83 and/or Article 56 EPC (see also T 161/18).

JPO analysis
The invention of claim 1 does not involve an inventive step.

The invention of claim 2 involves an inventive step.

The inventions of claim 1 and cited invention 1 are different from each other in the following respect.

Difference
The invention of claim 1 realises an estimation of hydroelectric power-generating capacity by means of a neural network having an input layer and output layer. Meanwhile, cited invention 1 realises an estimation of hydroelectric power-generating capacity by means of a regression equation model.

The difference is assessed as follows.

It is well known that an estimation process of an output in the future is carried out based on an input of time series data in the past, using a trained neural network. The neural network has been trained with training data containing an input of time series data in the past and a certain output in the future. Cited invention 1 and the well-known art both estimate a certain output in the future based on an input of time series data in the past, with reference to a correlation among data.

Therefore, a person skilled in the art could easily derive a configuration that enables estimation of hydroelectric power-generating capacity by applying the well-known art to cited invention 1 and adopting a trained neural network as a substitution for a regression equation model.

Further, a person skilled in the art would expect the effect of the invention of claim 1, and there is no obstructive factor found in applying the well-known art to cited invention 1.

Both cited invention 1 and the well-known art estimate an output in the future through an input of time series data in the past based on a correlation between data and have the same function.

The invention of claim 2 and cited invention 1 are different from each other in the following respect.

Difference
The invention of claim 2 contains, in input data into an input layer, a temperature of the upper stream of the river during a predetermined period between a reference time and a predetermined time before the reference time. Meanwhile, cited invention 1 does not have such a configuration.

The difference is assessed as follows.

The invention of claim 2 uses a temperature of the upper stream of the river for estimation of hydroelectric power-generating capacity. There is no prior art found disclosing such use of a temperature of the upper stream of the river. Accordingly, it is not common general technical knowledge that there is a correlation between temperature and hydroelectric power-generating capacity.

Generally, input of data whose correlation is unknown may cause noise in machine learning. However, the invention of claim 2 uses input data containing a temperature of the upper stream of the river during a predetermined period between a reference time and a predetermined time before the reference time. This enables a highly accurate estimation of hydroelectric power-generating capacity, taking an increase of inflow rate due to meltwater in the spring into consideration. It is a significant effect that a person skilled in the art cannot expect.

Accordingly, it is not considered to be a mere workshop modification that can be carried out in application of the well-known art to cited invention 1 by a person skilled in the art to include in input data in an estimation of hydroelectric power-generating capacity a temperature of the upper stream of the river during a predetermined period between a reference time and a predetermined time before the reference time.

Therefore, the invention of claim 2 involves an inventive step.

7. Case C-7
(from the EPO)

Title of invention
Remotely controlling an electronic device

Claim 1

A computer-implemented method for remotely controlling an electronic device, comprising the following steps:

— receiving touch input data at a remotely controlled device from a remote controller, the remote controller having a touch screen displaying a first graphical user interface (GUI), the touch input data comprising gestural input parameters describing a gesture trajectory, input by a user to a specifically assigned input area;

— displaying, by the remotely controlled device, a second GUI;

— interpreting the received touch input data to determine a command appropriate for the current application context of the second GUI;

— wherein the current context is one of a first or a second context depending on whether the electronic device is executing one of a first or a second application, and the touch input data is mapped to a first of a plurality of potential commands in a first context and to a second of the plurality of potential commands in a second context; and

— updating the first and second GUI in response to the command, wherein the first GUI provides feedback which command has been performed by the electronic device.

State of the art (prior art, well-known art, etc.)

Cited invention 1 (invention disclosed in cited document 1 (D1)):
Document D1 discloses a method for remotely controlling a device, comprising: receiving touch input data at a remotely controlled device from a remote controller comprising a touch screen displaying a virtual keyboard and a processing unit, the touch input data comprising information including key input parameters, wherein the touch input data is interpreted by the remotely controlled device as one of a plurality of potential GUI commands, and updating the GUI in response to the command.

Cited invention 2 (invention disclosed in cited document 2 (D2)):
Furthermore, it is assumed that the skilled person is also aware of document D2, which discloses a dynamically variable virtual keyboard, the key-to-command assignment (i.e. "command mapping") depending on a variable mode, which is to be set by user input.

EPO analysis
As the method according to the claim is computer-implemented, it involves technical means and therefore has technical character; hence the claimed method constitutes an invention within the meaning of Article 52(1) EPC.

Hence, the claimed subject-matter must be examined with respect to novelty and inventive step. The examination of inventive step requires an assessment of which features contribute to the technical character of the invention (EPO Guidelines G-VII, 5.4).

Application of the steps of the problem-solution approach according to EPO Guidelines G-VII, 5.4:

Step (i): In this first step of the problem-solution approach, the features which contribute to the technical character of the invention are determined on the basis of the technical effects achieved in the context of the invention. All features which contribute to the technical character need to be taken into account.

The present example concerns two interrelated graphical user interfaces (GUIs), one on a remotely controlled electronic device, the other on the remote controller. The two GUIs are coupled to a context-sensitive input mechanism. As pointed out in EPO Guidelines G-II, 3.7.1, on the one hand, GUIs comprise features of presenting information, and, on the other hand, receiving input as part of a human-computer interaction. The latter type of feature is more likely to have a technical character than those solely concerning data output and display. In particular, features which specify a mechanism enabling user input, such as entering text, making a selection or submitting a command, are normally considered to make a technical contribution.

Nevertheless, it is noted that the method of claim 1 comprises some features which are non-technical when viewed in isolation. Consequently, it needs to be ascertained whether these features contribute to the technical character of the method.

The first of these features is the touch input data comprising gestural input parameters. The plain and ordinary meaning of the term "gesture" is a movement of an object, usually

made or caused by a human being. Therefore, a "gesture" viewed in isolation lacks technical character. Moreover, gestural input parameters are not functional data, since they are determined by their content, e.g. by their movement trajectory. In particular, the fact that a given set of touch-key inputs and a given set of gestural inputs can be represented by the same numerical values clearly demonstrates that no technical contribution can be derived from this feature. (Note that here the content of the input parameter is of a cognitive nature, unlike functional data which has the potential to contribute to an invention's technical character. For further information on functional data, see the EPO Guidelines G-II, 3.6.3, "Data retrieval, formats and structures".)

The second of the features which is non-technical when viewed in isolation is the current context of the second GUI. Clearly, the "context" of a GUI is not technical; it can, for example, be a business or game context, depending on the application that is being executed. However, according to the claim, the first and second GUIs are updated in response to a command that is determined by interpreting the received touch input data in the current application context of the second GUI. Thereby, the user input can be mapped to different commands (irrespective of what the concrete user input is), in a context-sensitive manner. For example, a left-swipe on the first touch screen could trigger a page turn when the second GUI is used to display a book, whereas a left-swipe moves a game character to the left when the second GUI is used to display a game. As such, the current context interacts with the interpreting and updating steps. (Note that this interaction takes place only to the extent that the touch input data is mapped to a command that is appropriate for that context, whereas the concrete content of the GUI is irrelevant.) Hence, this feature contributes to the method's technical character and needs to be taken into account. A corresponding analysis thus needs to be performed in more detail in step (iii) of the problem-solution approach when the prior art is taken into account.

Step (ii): In the next step of the problem-solution approach, a suitable starting point in the prior art is selected as the closest prior art with a focus on the features contributing to the technical character of the invention identified in step (i). In this example the closest prior art is document D1.

Step (iii): In this third step of the problem-solution approach, the differences from the closest prior art are identified. The differences of the subject-matter of claim 1 over D1 are:

(1) the touch input data comprises gestural input parameters describing a gesture trajectory, input by a user to a specifically assigned input area (instead of key input parameters);

(2) the touch input data is mapped to a first of a plurality of potential commands in a first context and to a second of the plurality of potential commands in a second context, whereby the current context depends on whether the electronic device is executing one of a first or a second application;

(3) updating both GUIs upon determination of the appropriate command.

Sub-step iii(a): In sub-step (a), an objection of lack of novelty is raised if there are no differences with respect to the prior art (not even a non-technical difference). However, since the subject-matter of claim 1 is novel over the prior art, the distinguishing features will be considered in the next sub-step.

Sub-step iii(b): In sub-step (b), an objection of lack of inventive step is raised if the differences do not make any technical contribution. However, since the distinguishing features identified above are not of a purely non-technical nature, they will be considered in the next sub-step.

Sub-step iii(c): In this sub-step, the objective technical problem is formulated on the basis of the technical effects achieved by the distinguishing features. In addition, if the differences include features making no technical contribution, these features, or any non-technical effect achieved by the invention, may be used in the formulation of the objective technical problem as part of what is "given" to the skilled person, in particular as a constraint that has to be met.

The gestural input methodology according to distinguishing feature (1) has no interaction or synergetic effect with the context-sensitive "command mapping" defined by the other distinguishing features. Hence, distinguishing feature (1) on the one hand, and distinguishing features (2) and (3) on the other hand, address partial problems; see EPO Guidelines G-VII, 5.2, last paragraph – partial problems can be assessed independently from each other.

First partial problem – derived from distinguishing feature (1)
A gesture trajectory input does not result in an objectively more reliable – or otherwise technically improved – input over the tapping of a virtual key. Rather, whether to use a more or less refined "gesture", or a "tap" on a virtual key, reflects mere convention, i.e. a subjective user preference. (It is hereby to be noted that a simple "tap" on a virtual key does not input a gesture trajectory.) The first distinguishing feature thus poses the non-technical constraint of allowing gesture trajectory inputs, as distinguished from tap inputs on a virtual keyboard. The corresponding objective technical problem to be solved may be framed as how to modify D1 to

allow a gesture trajectory input instead of a key input. Given that D1 discloses a touchscreen, i.e. technical means capable of accepting any gestural input, including a trajectory, only obvious (software) modifications are needed to solve this problem. Distinguishing feature (1) can therefore not contribute to the presence of inventive step.

Second partial problem – derived from distinguishing features (2) and (3)
Distinguishing features (2) and (3) jointly map touch input data to a command in a context-sensitive manner and adapt both the GUI of the remotely controlled device and the GUI of the remote control accordingly. As mentioned earlier, GUIs can comprise features of presenting information, on the one hand, and receiving input as part of a human-computer interaction, on the other hand. The context-sensitive mapping of commands is part of an input mechanism, whereas the joint updating of the two GUIs also concerns the manner in which information is presented. According to EPO Guidelines G-II, 3.7, if the manner of presentation credibly assists the user in performing a technical task by means of a continued and/or guided human-machine interaction process, it produces a technical effect. This criterion seems to be met: thanks to the display of a GUI on the remote controller, a user can provide inputs without needing to view the GUI on the remotely controlled device and yet still achieve the desired response from said remotely controlled device. Therefore, the user is credibly assisted in controlling a remotely controlled device which supports a plurality of applications. Hence, all the effects provided by distinguishing features (2) and (3) need to be taken into account when formulating the objective technical problem to be solved.

A corresponding objective technical problem, which avoids pointers to the solution, can be formulated as how to efficiently control a remotely controlled device which supports a plurality of applications.

When starting from D1, the skilled person, in search of a solution, is prompted to consider D2. Since D2 teaches a dynamic virtual keyboard with a key-to-command assignment that is variable according to a user-selectable mode, it would be obvious for the skilled person to map the key-input parameters of D1 to a first out of a plurality of potential commands appropriate for a first application context and to a second out of a plurality of potential commands appropriate for a second application context (whereby the application context varies according to the application that is being executed on the remotely controlled device). However, since neither D1 nor D2 teaches or hints at a combined GUI adaptation, let alone a combined GUI adaptation based on a single-touch input that is interpreted in a context-dependent manner, the claimed subject-matter appears inventive.

Remark: In the hypothetical example case of distinguishing feature (3) being absent, the resulting subject-matter would be obvious, i.e. would lack inventive step, over a combination of D1 and D2.

JPO analysis
The invention of claim 1 involves an inventive step.

When the invention of claim 1 and cited invention 1 are compared, they differ in the following respect.

Difference 1
The touch input data comprises gestural input parameters describing a gesture trajectory, input by a user to a specifically assigned input area.

Difference 2
The touch input data is mapped to a first of a plurality of potential commands in a first context and to a second of the plurality of potential commands in a second context, whereby the current context depends on whether the electronic device is executing one of a first or a second application.

Difference 3
Updating both GUIs upon determination of the appropriate command.

Differences 1 to 3 will be considered.
D2 only states "the key-to-command assignment depending on a variable mode, which is to be set by user input"; therefore, the matter related to difference 1 and difference 3 is not disclosed at all. With regard to the matter related to difference 2, the claimed invention and D2 can be said to be partially identical in that “the touch input data is mapped to a first of a plurality of potential commands in a first context and to a second of the plurality of potential commands in a second context,” whereby the current context depends on whether the electronic device is "setting" either one of a first or a second "mode"; however, it is unreasonable to consider that the constituent features of difference 2 are completely presented in the prior art. Thus, there is no prior art suggesting differences 1 to 3. In addition, there are no grounds sufficient to support the discussion that adopting differences 1 to 3 above can be deemed to be a design variation, etc. (namely, a design variation or design choice associated with an application of specific techniques to solve certain problems) of cited invention 1.

When considering the above-mentioned circumstances comprehensively, it cannot be said that a person skilled in the art could have easily arrived at the invention of claim 1 on the basis of cited invention 1 and cited invention 2.

Notes

Regarding difference 1
If the gestural input were common general technical knowledge at the time of filing, the JPO would present the cited documents and highly probably determine that difference 1 could have been easily achieved by a person skilled in the art.

Regarding differences 2 and 3
The EPO assesses difference 2 and difference 3 together and acknowledges an inventive step based on difference 2 and difference 3. In addition, if difference 3 does not exist and only difference 2 exists, the EPO determines that difference 2 could have been easily achieved by a person skilled in the art. On the other hand, the JPO assesses difference 2 and difference 3 separately and, regardless of difference 3, finds the presence of an inventive step with difference 2 alone.

8. Case C-8
(from the EPO)

Title of Invention
Training a neural network ("drop-out")

Claim 1

A computer-implemented method of training a neural network including neurons, each neuron being associated with weights and a respective probability of being disabled, wherein the method comprises:

— obtaining a plurality of training inputs;

— for each training input, repeatedly performing the following steps:
  - selecting one or more neurons based on their respective probability;
  - disabling the selected neurons;
  - processing the training input with the neural network to generate a predicted output;
  - adjusting the weights based on the basis of comparing the predicted output with a reference value.

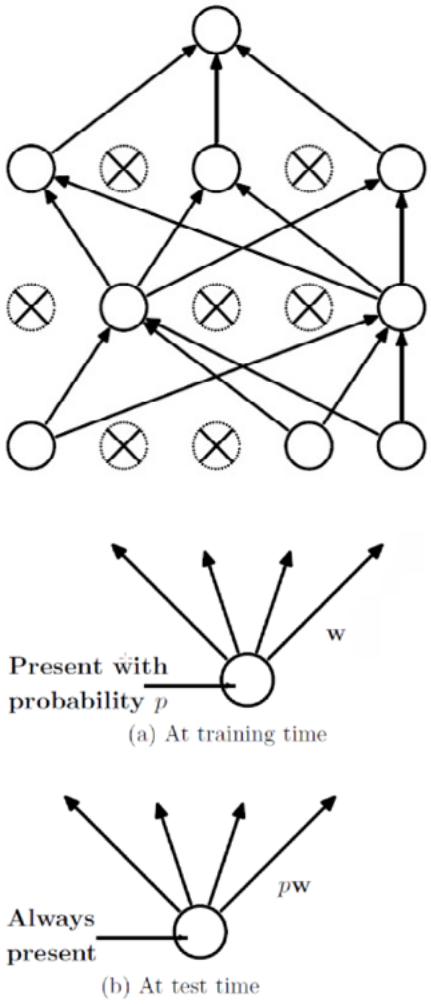
Description
"Drop-out" is a simple training method that prevents neural networks from "over-fitting", a notorious problem in machine learning (i.e. when a model loses its generalisation power, specialising too much on a given data set). Neurons are probabilistically silenced during training, and the "mean" network is used for inference. This is computationally inexpensive and has resulted in big improvements on most benchmark tasks. "Drop-out" was a breakthrough in deep learning that established a new standard in most scientific papers and many AI-related patent applications.

According to the description, neurons are selectively disabled during training with a probability of 0.5 (that is, on average, each neuron will be enabled for half of the training inputs and disabled for the other half of the training inputs). In another embodiment, neurons are selectively disabled with a probability of 0.2 (that is, on average, each neuron will be enabled for 80% of the training inputs and disabled for 20% of the training inputs).

After training the neural network, every neuron is enabled and its outgoing weights are reduced by multiplying them with the respective probability. This "normalisation" reduces the outgoing weights of each neuron by multiplying them by the probability that the neuron was not disabled. In an example, if the neurons of each hidden layer were selectively

disabled with a probability of 0.5 in the training stage, the outgoing weights are halved for the entire test case since approximately twice as many neurons will be enabled. A similar approach is applied to the input layers. The test set may then be processed by the neural network. The approach is illustrated in the figures below.

Figures



Prior art

The prior art is a general-purpose computer.

EPO analysis

As the method according to claim 1 is computer-implemented, it involves technical means and therefore has technical character; hence the claimed method constitutes an invention within the meaning of Article 52(1) EPC.

As such, the method of claim 1 has to be examined with respect to novelty and inventive step by following the problem-solution approach set out in EPO Guidelines G-VII, 5.4.

Application of the steps of the problem-solution approach:

Step (i): In this first step of the problem-solution approach, the features which contribute to the technical character of the invention are determined on the basis of the technical effects achieved in the context of the invention. All features which contribute to the technical character need to be taken into account.

According to EPO Guidelines G-II, 3.3.1, the term "neural network" (with neurons, weights) may, depending on the context, merely refer to abstract models or algorithms and does not, on its own, necessarily imply the use of any technical means. Therefore, without the reference to a computer implementation, the subject-matter of claim 1 would constitute a mathematical method as such, which is excluded from patentability for lack of technical character (Article 52(2)(a) and (3) EPC). This principle applies irrespective of whether such algorithms can be "trained" based on training data.

According to EPO Guidelines G-II, 3.3, a mathematical method can contribute to producing a technical effect either by its application to a field of technology or by being adapted to a specific technical implementation. In the case of claim 1, neither of these two criteria is applicable, since the claim is directed to the workings of a neural network without serving a technical purpose or by being implemented in a specific manner which takes into account the internal functioning of a computer. Rather, all that the claims specify is the computer implementation of mathematical method steps. In such a case, it is not sufficient that the mathematical method is algorithmically more efficient than prior-art mathematical methods to establish a technical effect (see also EPO Guidelines G-II, 3.6). Indeed, in the case of claim 1, it is not evident that the mathematical steps of the method interact with the technical features of the claim beyond a straightforward implementation on a general-purpose computer. Therefore, it is only the implementation of a general-purpose computer which needs to be taken into account.

Step (ii): In the next step of the problem-solution approach, a suitable starting point in the prior art is selected as the closest prior art with a focus on the features contributing to the technical character of the invention identified in step (i).

In view of the fact that the mathematical method does not contribute to the claim's technical character, the closest prior art is a general-purpose computer.

If the method made a technical contribution, on the other hand, it would not be sufficient to rely on a general-purpose computer as prior art. In that case, the search would need to take into account the steps of the mathematical method.

Step (iii): In this third step of the problem-solution approach, the differences from the closest prior art are identified.

The differences of the subject-matter of claim 1 over a general-purpose computer are simply the claim's method steps.

Sub-step iii(a): In sub-step (a), an objection of lack of novelty is raised if there are no differences with respect to the prior art (not even a non-technical difference).

Since the method of claim 1 is novel over the prior art, the distinguishing features will be considered in the next sub-step.

Sub-step iii(b): In sub-step (b), an objection of lack of inventive step is raised if the differences do not make any technical contribution.

Since, as outlined above, the distinguishing method steps defined in claim 1 do not contribute to the technical character of the claimed subject-matter, they cannot form the basis for an inventive step. Consequently, an objection is raised under Article 56 EPC.

Remark: If the claim functionally limited the mathematical method to serve a technical purpose, then the mathematical method would contribute to producing a technical effect and could be taken into account when assessing inventive step. In that case, the steps of generating the training set and training the classifier may also contribute to the technical character of the invention if they support achieving that technical purpose (See EPO Guidelines G-II, 3.3.1, and T 598/07). This principle is applicable even if the distinguishing features bring about benefits in terms of computational efficiency. A functional link between the technical purpose and the mathematical method steps can be established, for example, by specifying how the input and the output of the sequence of mathematical steps relate to the technical purpose so that the mathematical method is causally linked to a technical effect.

JPO analysis

The invention of claim 1 involves an inventive step.

In the examination at the JPO, the claimed invention is identified based on the definitions in the claim and all matter to specify the invention described in the claim is taken into account in principle. Therefore, when the invention of claim 1 and a general-purpose computer are compared, they differ in the following respect.

Difference

The invention of claim 1 is a computer-implemented method of training a neural network including neurons, each neuron being associated with weights and a respective probability of being disabled, wherein the method comprises obtaining a plurality of training inputs; for each training input, repeatedly performing the following steps: selecting one or more neurons based on their respective probability; disabling the selected neurons; processing the training input with the neural network to generate a predicted output; adjusting the weights based on comparing the predicted output with a reference value.

No prior art disclosing the difference described above has been found. Moreover, there are no grounds sufficient to support the discussion that adding constituent features pertaining to said difference from a general-purpose computer can be deemed to be a design variation, etc. (namely, a design variation or design choice associated with an application of specific techniques to solve certain problems).

Furthermore, the invention of claim 1 involves an advantageous effect over a neural network in avoiding the occurrence of "over-fitting" in the machine learning.

When considering the above-mentioned circumstances comprehensively, it cannot be said that a person skilled in the art could have easily arrived at the invention of claim 1 based on a general-purpose computer.

Notes

At the JPO, inventive step is identified based on the prior art, and the JPO would strive to find the most similar prior art including the disclosure of the matter specifying the invention of claim 1. Consequently, inventive step would not be denied based on a general-purpose computer in examination at the JPO; however, if any prior art regarding "drop-out" were to be found, it would be denied in examination at the JPO.

D. Sufficiency of disclosure/enablement requirement

1. Case D-1

(from JPHB, Annex A, Chap. 1, Case 46)

Title of the invention

Sugar content estimation system

What is claimed is:

Claim 1

A sugar content estimation system comprising:

— a storage means for storing face images of people and sugar contents of vegetables produced by the people;

— a model generation means for generating a determination model through machine learning, to which a face image of a person is input and from which a sugar content of a vegetable produced by the person is output, using training data containing the face images of the people stored in the storage means and the sugar contents of the vegetables,

— a reception means for receiving an input of a face image; and

— a processing means for outputting, using the generated determination model that has been generated by the model generation means, a sugar content of a vegetable produced by a person that is estimated based on the face image of the person inputted to the reception means.

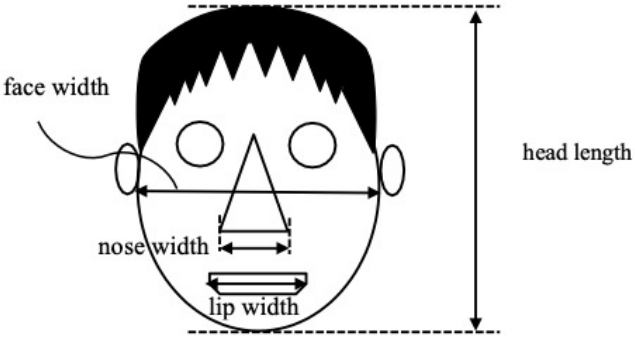
Overview of the description

It is an object of the present invention to provide a system that estimates the sugar content of a vegetable produced by a person based on their face image, taking advantage of the existence of a certain correlation between a face feature of a person and the sugar content of a vegetable produced by the person. For example, a face figure is characterised by the head length, face width, nose width and lip width as shown in the figure. Here, "sugar content" of a vegetable means the sugar content at the time when a certain period predetermined for each type of vegetable has passed after seeding. With this system, it is possible to estimate which person can produce a vegetable with the highest sugar content in a community.

A sugar content estimation system of the present invention firstly receives an input of a face image of a person by a user. The sugar content of a vegetable produced by a person is obtained using a determination model to which a face image of the person is input and from which the sugar content of the vegetable produced by the person is output. The determination model is generated through supervised machine learning using a known machine learning algorithm such as a convolutional neural network, learning correlation between a face image of a person and the sugar content of a vegetable produced by the person.

Note: In this case, it is assumed that, even in view of common general technical knowledge at the time of filing, a person skilled in the art cannot presume a certain relation such as a correlation (hereinafter referred to as "correlation or the like") between a face image of a person and the sugar content of a vegetable produced by the person.

Figure



EPO analysis

The requirements of Article 83 EPC

According to Article 83 EPC, a patent application must disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art. As pointed out in EPO Guidelines F-III, 12, if a claimed invention lacks reproducibility, this may become relevant under either the requirement of sufficiency of disclosure or the requirement of inventive step, as the case may be. In particular, if an invention lacks reproducibility because the desired technical effect as expressed in the claim is not achieved, this results in a lack of sufficient disclosure, which has to be objected to under Article 83 EPC. Otherwise, i.e. if the effect is not expressed in the claim but is part of the problem to be solved, there is a problem of inventive step (see G 1/03, Reasons 2.5.2, T 1079/08, T 1319/10, T 5/06 and T 380/05).

In the case of the claimed sugar content estimation system, the desired technical effect is clearly expressed in the claim, namely that the processing means output the sugar content of a vegetable produced by a person based on the face image of said person.

Consequently, a question under Article 83 EPC arises, namely whether the patent application contains sufficient information to allow the person skilled in the art, using their common general knowledge, to reproduce the claimed sugar content estimation system.

In relation to the technical principle underlying the claimed system, the description teaches that a convolutional neural network is trained to learn the correlation between face images of people producing a vegetable and the respective sugar content of a vegetable produced by each of said people.

However, on the basis of common general knowledge, the person skilled in the art would have serious doubts that the face of a person producing a vegetable is correlated with the sugar content of a vegetable produced by said person. Since such a correlation is a prerequisite for bringing about the technical effect expressed in the claim, the skilled person would conclude that the claimed sugar content estimation system cannot be reproduced based on the information provided in the description, even when taking into account common general knowledge.

Consequently, the claimed sugar content estimation system is not disclosed in a manner sufficiently clear and complete for the skilled person to carry it out, contrary to the requirements of Article 83 EPC.

In cases such as this one, where there are serious doubts as regards the possibility of performing the invention and repeating it as described, the burden of proof as regards this possibility, or at least a demonstration that success is credible, rests with the applicant or the proprietor of the patent (see EPO Guidelines F-III, 4).

JPO analysis

Article 36(4)(i) JPA (enablement requirement)

According to the description, a human face image is used for an input to a determination model that estimates the sugar content of a vegetable produced by the person. The description says that a face feature is characterised by the head length, face width, nose width and lip width, for example.

However, the description only discloses that there is a certain correlation between a face image of a person and the sugar content of a vegetable produced by the person and does not disclose any correlation or the like between them, although it discloses that a face feature is characterised by the head length, face width, nose width and lip width, for example. It cannot be presumed that there is a correlation or the like between them, even if common general technical knowledge at the time of filing is taken into consideration. Further, there is no performance evaluation result of an actually generated determination model shown in the description.

Accordingly, it is not possible for a person skilled in the art to derive a sugar content estimation system that outputs an estimation of the sugar content of a vegetable produced by a person based on an input of a face image of the person, even if the disclosure in the description and common general technical knowledge at the time of filing are taken into consideration.

Therefore, the "sugar content estimation system" in claim 1 is not disclosed in the description in a manner such that a person skilled in the art can make and use the system. In other words, the description does not provide a clear and sufficient disclosure for a person skilled in the art to carry out the invention.

Measures to be taken by the applicant

The reason for rejection will not be resolved unless the applicant submits a written opinion and proves that, based on common knowledge in the art at the time of filing, it can be inferred that there is a correlation, etc., between the facial image of a person and the sugar content of the vegetables grown by the person.

Furthermore, the reason for refusal cannot be overcome even if the applicant, to argue that the object of the invention can be achieved, submits a certificate of experimental results that supports the estimation by the trained model of claim 1.

2. Case D-2

(from JPHB, Annex A, Chap.1, Case 47)

Title of the Invention

Business plan design apparatus

What is claimed is:

Claim 1

A business plan design apparatus comprising:

— a storage means for storing a stock amount of a specific product;

— a reception means for receiving a web advertisement data and mention data of the specific product;

— a simulation and output means for, using an estimation model that has been trained through machine learning with a training data containing a web advertisement data and mention data of a similar product that has been sold in the past and a sales quantity of the similar product, simulating and outputting a future sales quantity of the specific product estimated based on the web advertisement data and mention data of the specific product;

— a production plan making means for planning a future production quantity of the specific product, based on the stored stock amount and the output sales quantity; and

— an output means for outputting the output sales quantity and the production plan.

Overview of the description

As the internet is widely spreading, a web advertisement has become an effective way for sales promotion of a product. However, it cannot readily be determined in real-time whether a web advertisement is actually effective and, through trial and error, not a few business opportunities have been wasted due to stock shortage or the like. In view of this, it is an object of the present invention to provide a business plan design apparatus that estimates the sales quantity of a specific product in the future based on web advertisement data and mention data of the product and presents a production plan of the product including a future production quantity based on a stored stock amount and an estimated sales quantity. With this apparatus, a seller of a specific product can revise a production plan of the product at an early stage.

The business plan design apparatus firstly stores a stock amount of a specific product. The apparatus then obtains an estimated sales quantity of the product based on an input of web advertisement data and mention data of the product, using an estimation model that outputs an estimated product sales quantity. In this case, the web advertisement data is the number of times the specific product publicly appeared on the web. The term "advertisement" includes banner ads, product listing ads and direct emails. The mention data includes reviews of the product or advertisement in web articles, on social media, in blogs, etc. In the reviews of the product or advertisement, an evaluation value is set so that it becomes greater if there are a lot of positive reviews, and otherwise it becomes lower. The evaluation value can be obtained through known computer processing of the text in web articles, on social media, in blogs, etc. The estimation model is generated through supervised machine learning with training data using a known machine learning algorithm, such as a neural network. The training data contains a relation between web advertisement data and mention data of a similar product that has been sold in the past and an actual sales quantity of the similar product.

The model compares the stored stock amount and the estimated sales quantity of the product. Then, the model makes a plan for increased production if the sales quantity exceeds the stored stock amount, and otherwise makes a plan for decreased production.
The apparatus, using the estimation model that has been trained in this way, simulates a sales quantity of a product; compares the sales quantity and a stock amount of the product; and presents the comparison in a manner that a user can readily determine whether production of the product should be increased or decreased.

Note: In this case, it is assumed that, in view of common general technical knowledge at the time of filing, a person skilled in the art can presume a certain relation such as a correlation (hereinafter referred to as "correlation or the like") between advertisement data and reference data on the web and sales quantity.

EPO analysis

The claim defines an apparatus. According to the any-technical-means approach adopted by the EPO, the subject-matter defined by the claim is thus not excluded under Article 52(2) and (3) EPC, i.e. it is regarded as an invention within the meaning of Article 52(1) EPC.

The technical means defined by claim 1 (storage means, reception means, simulation and output means, production plan making means and output means) can all be realised by means of a computer program running on a general-purpose computer. As such, the fact that the claim is drafted in terms of "means" does not imply a concrete, technical implementation that goes beyond any programmable general-purpose computer. On the assumption that a programmable general-purpose computer also constitutes the closest prior

art, the subject-matter of claim 1 effectively differs from the prior art in that it is adapted to carry out a method for planning sales and production quantities.

In essence, the apparatus of claim 1 generates planned sales and production quantities by performing a method on a set of stored and/or received input data (e.g. a stored stock amount of a specific product and received web advertisement data and mention data of the specific product). Performing the simulation step of said method involves "machine learning" that is applied to the input data for the purpose of estimating a future sales quantity. In this context, it is noted that the term "machine learning" merely refers to an abstract mathematical method and does not, on its own, imply a contribution to the claim's technical character. According to EPO Guidelines G-II, 3.3, "Mathematical methods" and 3.3.1, "Artificial intelligence and machine learning", a contribution to a claim's technical character requires that a mathematical method, i.e. the simulation step defined in terms of machine learning, serves a technical purpose. The underlying purpose of estimating future sales quantities, however, is non-technical and addresses an inherently business-related problem. Therefore, the mathematical method specified in claim 1 contributes to the technical character of the claimed apparatus only to the extent that a piece of software is carried out by a general-purpose computer. However, the specific nature of the software which, when run on a computer, executes the simulation step does not make a technical contribution.

Similarly, the "production plan making means for planning a future production quantity of the specific product, based on the stored stock amount and the output sales quantity" and "output means for outputting the output sales quantity and the production plan" can also be considered mathematical steps which are realised by way of a suitably programmed general-purpose-computer. Since the underlying purpose of said steps is non-technical, just as in the case of the simulation step, there is no technical contribution to the claimed apparatus. Alternatively, these two features can also be considered to be merely paraphrased non-technical decision-making steps in a business context that appear technical only superficially by using the term "means". However, the mere automation of business method steps makes no technical contribution either.

Consequently, all the differences from the prior art fail to make a technical contribution.

According to EPO Guidelines G-VII, 5.4, "Claims comprising technical and non-technical features", if the differences do not make any technical contribution, an objection is raised under Article 56 EPC. The reasoning for the objection is that the subject-matter of the claim cannot be inventive if there is no technical contribution to the prior art. Consequently, the business plan design apparatus of claim 1 does not involve an inventive step within the meaning of Article 56 EPC.

In a situation such as this example, where the claim defines the mere automation of something non-technical, such as a business method, the EPO would refuse the application for lack of inventive step rather than for lack of sufficiency. Therefore, there is no need to assess the requirements of Article 83 EPC.

JPO analysis

No reason for refusal is found.

Article 36(4)(i) JPA (enablement requirement)

The description discloses that web advertisement data and mention data are used. The web advertisement data is based on the number of times a specific product publicly appeared on the web, and the mention data is based on an evaluation value of reviews of the product or advertisement in web articles, on social media, in blogs, etc.

Although the description does not disclose a correlation or the like between the web advertisement data and the mention data and sales quantity, it can be presumed that there is a correlation or the like between them in view of common general technical knowledge at the time of filing.

Furthermore, it is known at the time of filing that an estimation model can be generated that estimates an output in response to an input through machine learning with training data containing input data and output data having a correlation or the like, using a generally used machine learning algorithm.

In view of the above, an estimation model can be generated using a universal machine learning algorithm with training data containing the number of times a similar product publicly appeared in a web advertisement; an evaluation value of reviews of the product or advertisement in web articles, on social media, in blogs, etc.; and a sales quantity of the similar product. Accordingly, it is obvious for a person skilled in the art that a business plan design apparatus can be derived that simulates and outputs a sales quantity of a specific product and makes a production plan of the specific product based on the output sales quantity, using the above estimation model.

Therefore, the "business plan design apparatus" in claim 1 is disclosed in the description in such a manner that a person skilled in the art can make and use the apparatus. In other words, the description provides a clear and sufficient disclosure for a person skilled in the art to carry out the invention.

3. Case D-3

(from JPHB, Annex A, Chap. 1, Case 48)

Title of the invention

Autonomous vehicle

What is claimed is:

Claim 1

An autonomous vehicle having a driver monitoring device, the driver monitoring device including:

— an image obtainment unit that obtains an image taken by an imaging device that has been positioned so as to take an image of a driver seated in a vehicle seat; and

— a quick reaction capability estimation unit that inputs the taken image to a trained learning model and obtains a quick reaction capability score representing a quick reaction capability of the driver during vehicle operation from the trained learning model, the trained learning model having been trained through machine leaning to estimate a quick reaction capability of the driver during vehicle operation,

— wherein switching from an autonomous operation mode in which a vehicle is operated automatically to a manual operation mode in which a vehicle is operated manually by a driver is prohibited, in a case where the obtained quick reaction capability score does not satisfy a predetermined condition.

Overview of the description

An autonomous vehicle having a driver monitoring device of the present invention is configured in a manner that an operation mode can selectively be switched between an autonomous operation mode in which a vehicle is operated automatically and a manual operation mode in which a vehicle is operated manually by a driver. During operation in the autonomous operation mode, switching from the autonomous operation mode to the manual operation mode is prohibited where the quick reaction capability of the driver to vehicle operation does not satisfy a predetermined condition. The quick reaction capability of the driver is represented by a quick reaction capability score that is obtained by the driver monitoring device. With this configuration, it is possible to provide a vehicle in which switching the operation mode from an autonomous operation mode to a manual operation mode is allowed only when it is appropriate to do so, based on the quick reaction capability of a driver.

The driver monitoring device obtains a quick reaction capability score from a learning model that outputs the quick reaction capability score in response to an input of an image of a driver seated in a vehicle seat. The learning model is generated using a known machine learning algorithm such as a neural network. Training data that is input to the machine learning algorithm can be generated by associating a quick reaction capability score with each of a plurality of images of a driver seated in a vehicle seat in various situations. The images of a driver are taken by a camera, for example, that is positioned so as to take an image of a driver seated in a vehicle seat.

The quick reaction capability score in this case is a numeric parameter between 0 and 10. Each of the images of a driver with various types of behaviour is manually evaluated, and then a quick reaction capability score is set for each of the images. For example, when a driver is "holding the steering wheel", "operating a meter", "operating a navigation system" or the like, it is determined that the driver is ready for vehicle operation and a high numeric parameter is assigned to the image.

Meanwhile, when a driver is "chatting", "smoking", "eating", "talking on the phone", "using a cell phone" or the like, it is determined that the driver is not ready for vehicle operation and a low numeric parameter is assigned to the image.

The quick reaction capability score may be assigned differently depending on each specific situation, even for similar behaviour. For example, the quick reaction capability score may be assigned differently for "holding the steering wheel" or "chatting" depending on a driver's face direction, face expression or the like.

Similarly, the quick reaction capability score may be assigned differently for "eating" depending on the food.

Note: In this case, it is assumed that, in view of common general technical knowledge at the time of filing, a person skilled in the art can presume a certain relation such as correlation (hereinafter referred to as "correlation or the like") between a driver's behaviour that has been taken in an image and a quick reaction capability to vehicle operation.

EPO analysis

The requirements of Article 83 EPC

Similarly to the sugar content estimation system, the desirable technical effect is also clearly expressed in the claim to the autonomous vehicle. In particular, the claim requires estimation of the quick reaction capability score of a driver seated in the vehicle's seat by means of a trained machine learning model and switching of the operation mode of the autonomous vehicle when the estimated quick reaction capability does not satisfy a predetermined condition.

Consequently, in relation to this example too, a question under Article 83 EPC arises, namely whether the patent application contains sufficient information to allow the person skilled in the art, using their common general knowledge, to reproduce the claimed autonomous vehicle. Having regard to the requirement of reproducibility, it is noted that reproducing the claimed invention must not involve an undue burden. However, if a limited amount of trial and error leads to success, the requirements of Article 83 EPC are considered fulfilled.

According to the description, the quick reaction capability score is obtained by means of a trained machine learning model. The training data that is input to the machine learning algorithm comprises images of a driver seated in the vehicle's seat, whereby each of the images is manually evaluated and a corresponding quick reaction capability score is set. The description also gives a number of examples of how to determine the quick reaction capability score. For example, when a driver is "holding the steering wheel", "operating a meter", "operating a navigation system" or the like, it is determined that the driver is ready for vehicle operation and a high numeric parameter is assigned to the image. Meanwhile, when a driver is "chatting", "smoking", "eating", "talking on the phone", "using a cell phone" or the like, it is determined that the driver is not ready for vehicle operation and a low numeric parameter is assigned to the image. In addition, facial orientation and facial expressions of the driver, or actions such as eating food, can also be taken into account.

The skilled person thus understands that the machine learning model is trained to recognise certain behaviour of the driver from an image taken of the driver. If the behaviour is recognised, the trained machine learning model can then output a corresponding quick reaction capability score.

From common general knowledge, it is known to the skilled person in the field of image processing that machine learning models are in principle capable of performing such image recognition tasks, provided that the machine learning model is chosen correctly (e.g. with an adequate structure and sufficient complexity) and is trained with a sufficient number of training images. The trained machine learning model will then be capable of correlating the behaviour captured in an image of the driver with similar behaviour of drivers depicted in the training images. While the description does not provide any further details on which kind of machine learning model to use for this task, it seems that the person skilled in the art of image processing is generally in a position to select an adequate machine learning model without any undue burden, i.e. in the sense that only a limited amount of trial and error would be needed.

Therefore, the requirements of Article 83 EPC are considered fulfilled.

JPO analysis

No reason for refusal is found.

Article 36(4)(i) JPA (enablement requirement)

The description discloses (i) using multiple images of a driver seated in a vehicle seat that have been taken by a camera positioned so as to take images of the driver with various behaviour and (ii) using a quick reaction capability score based on numeric parameters that have manually been assigned to the images taken.

Further, the description discloses examples of a driver's behaviour in an image and a corresponding numeric parameter. It can be presumed that, in view of common general technical knowledge at the time of filing, there is a correlation or the like between a driver's behaviour as seen in an image and the quick reaction capability of the driver.

It is also common general technical knowledge for a person skilled in the art at the time of filing that a learning model can be generated that estimates an output in response to an input through machine learning with training data containing input data and output data having a correlation or the like with each other, using a generally used machine learning algorithm.

In view of the above, a learning model can be generated using a universal machine learning algorithm with training data containing images of a driver and numeric parameters that have manually been assigned to the images through evaluation of each image. Accordingly, it is obvious for a person skilled in the art that an autonomous vehicle can be derived that (i) obtains a quick reaction capability score representing the quick reaction capability of the driver during vehicle operation from the above-mentioned learning model, and (ii) prohibits switching from an autonomous operation mode in which a vehicle is operated automatically to a manual operation mode in which a vehicle is operated manually by a driver where the quick reaction capability score obtained does not satisfy a predetermined condition.

Therefore, the "autonomous vehicle" in claim 1 is disclosed in the description in a manner such that a person skilled in the art can make and use the vehicle. In other words, the description provides a clear and sufficient disclosure for a person skilled in the art to carry out the invention.

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