

# CPC COOPERATIVE PATENT CLASSIFICATION

## G PHYSICS (NOTES omitted)

### INSTRUMENTS

## G06 COMPUTING; CALCULATING; COUNTING (NOTES omitted)

## G06N COMPUTING ARRANGEMENTS BASED ON SPECIFIC COMPUTATIONAL MODELS

### WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

### 3/00 Computing arrangements based on biological models

- 3/002 . {Biomolecular computers, i.e. using biomolecules, proteins, cells (using DNA [G06N 3/123](#); using neurons [G06N 3/061](#))}
- 3/004 . Artificial life, i.e. computing arrangements simulating life
- 3/006 . . based on simulated virtual individual or collective life forms, e.g. social simulations or particle swarm optimisation [PSO]
- 3/008 . . based on physical entities controlled by simulated intelligence so as to replicate intelligent life forms, e.g. based on robots replicating pets or humans in their appearance or behaviour
- 3/02 . Neural networks
- 3/04 . . Architecture, e.g. interconnection topology

### WARNING

Group [G06N 3/04](#) is impacted by reclassification into groups [G06N 3/0464](#), [G06N 3/0475](#), [G06N 3/0495](#) and [G06N 3/0499](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 3/0409 . . . {Adaptive resonance theory [ART] networks}
- 3/0418 . . . {using chaos or fractal principles}
- 3/042 . . . Knowledge-based neural networks; Logical representations of neural networks
- 3/043 . . . based on fuzzy logic, fuzzy membership or fuzzy inference, e.g. adaptive neuro-fuzzy inference systems [ANFIS]
- 3/044 . . . Recurrent networks, e.g. Hopfield networks

### WARNING

Group [G06N 3/044](#) is impacted by reclassification into group [G06N 3/0442](#).

Groups [G06N 3/044](#) and [G06N 3/0442](#) should be considered in order to perform a complete search.

- 3/0442 . . . . characterised by memory or gating, e.g. long short-term memory [LSTM] or gated recurrent units [GRU]

### WARNING

Group [G06N 3/0442](#) is incomplete pending reclassification of documents from group [G06N 3/044](#).

Groups [G06N 3/044](#) and [G06N 3/0442](#) should be considered in order to perform a complete search.

- 3/045 . . . Combinations of networks

### WARNING

Group [G06N 3/045](#) is impacted by reclassification into group [G06N 3/0455](#).

Groups [G06N 3/045](#) and [G06N 3/0455](#) should be considered in order to perform a complete search.

- 3/0455 . . . . Auto-encoder networks; Encoder-decoder networks

### WARNING

Group [G06N 3/0455](#) is incomplete pending reclassification of documents from group [G06N 3/045](#).

Groups [G06N 3/045](#) and [G06N 3/0455](#) should be considered in order to perform a complete search.

- 3/0463 . . . {Neocognitrons}
- 3/0464 . . . Convolutional networks [CNN, ConvNet]

### WARNING

Group [G06N 3/0464](#) is incomplete pending reclassification of documents from group [G06N 3/04](#).

Groups [G06N 3/04](#) and [G06N 3/0464](#) should be considered in order to perform a complete search.

- 3/047 . . . Probabilistic or stochastic networks

**WARNING**

Group [G06N 3/047](#) is impacted by reclassification into group [G06N 3/0475](#).

Groups [G06N 3/047](#) and [G06N 3/0475](#) should be considered in order to perform a complete search.

- 3/0475 . . . Generative networks

**WARNING**

Group [G06N 3/0475](#) is incomplete pending reclassification of documents from groups [G06N 3/04](#) and [G06N 3/047](#).

Groups [G06N 3/04](#), [G06N 3/047](#), and [G06N 3/0475](#) should be considered in order to perform a complete search.

- 3/048 . . . Activation functions

- 3/049 . . . Temporal neural networks, e.g. delay elements, oscillating neurons or pulsed inputs

- 3/0495 . . . Quantised networks; Sparse networks; Compressed networks

**WARNING**

Group [G06N 3/0495](#) is incomplete pending reclassification of documents from group [G06N 3/04](#).

Groups [G06N 3/04](#) and [G06N 3/0495](#) should be considered in order to perform a complete search.

- 3/0499 . . . Feedforward networks

**WARNING**

Group [G06N 3/0499](#) is incomplete pending reclassification of documents from group [G06N 3/04](#).

Groups [G06N 3/04](#) and [G06N 3/0499](#) should be considered in order to perform a complete search.

- 3/06 . . Physical realisation, i.e. hardware implementation of neural networks, neurons or parts of neurons

- 3/061 . . . {using biological neurons, e.g. biological neurons connected to an integrated circuit}

- 3/063 . . . using electronic means

- 3/065 . . . . Analogue means

- 3/067 . . . using optical means

- 3/0675 . . . . {using electro-optical, acousto-optical or opto-electronic means}

- 3/08 . . Learning methods

**WARNING**

Group [G06N 3/08](#) is impacted by reclassification into groups [G06N 3/0895](#), [G06N 3/09](#), [G06N 3/091](#), [G06N 3/092](#), [G06N 3/094](#), [G06N 3/096](#), [G06N 3/098](#) and [G06N 3/0985](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 3/082 . . . modifying the architecture, e.g. adding, deleting or silencing nodes or connections

- 3/084 . . . Backpropagation, e.g. using gradient descent

- 3/086 . . . using evolutionary algorithms, e.g. genetic algorithms or genetic programming

- 3/088 . . . Non-supervised learning, e.g. competitive learning

- 3/0895 . . . Weakly supervised learning, e.g. semi-supervised or self-supervised learning

**WARNING**

Group [G06N 3/0895](#) is incomplete pending reclassification of documents from group [G06N 3/08](#).

Groups [G06N 3/08](#) and [G06N 3/0895](#) should be considered in order to perform a complete search.

- 3/09 . . . Supervised learning

**WARNING**

Group [G06N 3/09](#) is incomplete pending reclassification of documents from group [G06N 3/08](#).

Groups [G06N 3/08](#) and [G06N 3/09](#) should be considered in order to perform a complete search.

- 3/091 . . . Active learning

**WARNING**

Group [G06N 3/091](#) is incomplete pending reclassification of documents from group [G06N 3/08](#).

Groups [G06N 3/08](#) and [G06N 3/091](#) should be considered in order to perform a complete search.

- 3/092 . . . Reinforcement learning

**WARNING**

Group [G06N 3/092](#) is incomplete pending reclassification of documents from group [G06N 3/08](#).

Groups [G06N 3/08](#) and [G06N 3/092](#) should be considered in order to perform a complete search.

- 3/094 . . . Adversarial learning

**WARNING**

Group [G06N 3/094](#) is incomplete pending reclassification of documents from group [G06N 3/08](#).

Groups [G06N 3/08](#) and [G06N 3/094](#) should be considered in order to perform a complete search.

- 3/096 . . . Transfer learning

**WARNING**

Group [G06N 3/096](#) is incomplete pending reclassification of documents from group [G06N 3/08](#).

Groups [G06N 3/08](#) and [G06N 3/096](#) should be considered in order to perform a complete search.

- 3/098 . . . Distributed learning, e.g. federated learning

**WARNING**

Group [G06N 3/098](#) is incomplete pending reclassification of documents from group [G06N 3/08](#).

Groups [G06N 3/08](#) and [G06N 3/098](#) should be considered in order to perform a complete search.

- 3/0985 . . . Hyperparameter optimisation; Meta-learning; Learning-to-learn

**WARNING**

Group [G06N 3/0985](#) is incomplete pending reclassification of documents from group [G06N 3/08](#).

Groups [G06N 3/08](#) and [G06N 3/0985](#) should be considered in order to perform a complete search.

- 3/10 . . Interfaces, programming languages or software development kits, e.g. for simulating neural networks
- 3/105 . . . {Shells for specifying net layout}
- 3/12 . . using genetic models
- 3/123 . . DNA computing
- 3/126 . . Evolutionary algorithms, e.g. genetic algorithms or genetic programming

**5/00 Computing arrangements using knowledge-based models**

- 5/01 . . Dynamic search techniques; Heuristics; Dynamic trees; Branch-and-bound
- 5/013 . . {Automatic theorem proving}
- 5/02 . . Knowledge representation; Symbolic representation
- 5/022 . . Knowledge engineering; Knowledge acquisition
- 5/025 . . . Extracting rules from data
- 5/027 . . {Frames}
- 5/04 . . Inference or reasoning models
- 5/041 . . {Abduction}
- 5/042 . . {Backward inferencing}
- 5/043 . . Distributed expert systems; Blackboards
- 5/045 . . Explanation of inference; Explainable artificial intelligence [XAI]; Interpretable artificial intelligence
- 5/046 . . Forward inferencing; Production systems
- 5/047 . . . Pattern matching networks; Rete networks
- 5/048 . . Fuzzy inferencing

**7/00 Computing arrangements based on specific mathematical models**

- 7/01 . . Probabilistic graphical models, e.g. probabilistic networks
- 7/02 . . using fuzzy logic (computing arrangements based on biological models [G06N 3/00](#); computing arrangements using knowledge-based models [G06N 5/00](#))
- 7/023 . . {Learning or tuning the parameters of a fuzzy system}
- 7/026 . . {Development tools for entering the parameters of a fuzzy system}
- 7/04 . . Physical realisation
- 7/043 . . . {Analogue or partially analogue implementation}

- 7/046 . . . {Implementation by means of a neural network (neural networks using fuzzy logic [G06N 3/043](#))}

- 7/06 . . Simulation on general purpose computers
- 7/08 . . using chaos models or non-linear system models

**10/00 Quantum computing, i.e. information processing based on quantum-mechanical phenomena**

**WARNING**

Group [G06N 10/00](#) is impacted by reclassification into groups [G06N 10/20](#), [G06N 10/40](#), [G06N 10/60](#), [G06N 10/70](#) and [G06N 10/80](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 10/20 . . Models of quantum computing, e.g. quantum circuits or universal quantum computers

**WARNING**

Group [G06N 10/20](#) is incomplete pending reclassification of documents from group [G06N 10/00](#).

Groups [G06N 10/00](#) and [G06N 10/20](#) should be considered in order to perform a complete search.

- 10/40 . . Physical realisations or architectures of quantum processors or components for manipulating qubits, e.g. qubit coupling or qubit control

**WARNING**

Group [G06N 10/40](#) is incomplete pending reclassification of documents from group [G06N 10/00](#).

Groups [G06N 10/00](#) and [G06N 10/40](#) should be considered in order to perform a complete search.

- 10/60 . . Quantum algorithms, e.g. based on quantum optimisation, quantum Fourier or Hadamard transforms

**WARNING**

Group [G06N 10/60](#) is incomplete pending reclassification of documents from group [G06N 10/00](#).

Groups [G06N 10/00](#) and [G06N 10/60](#) should be considered in order to perform a complete search.

- 10/70 . . Quantum error correction, detection or prevention, e.g. surface codes or magic state distillation

**WARNING**

Group [G06N 10/70](#) is incomplete pending reclassification of documents from group [G06N 10/00](#).

Groups [G06N 10/00](#) and [G06N 10/70](#) should be considered in order to perform a complete search.

- 10/80
- Quantum programming, e.g. interfaces, languages or software-development kits for creating or handling programs capable of running on quantum computers; Platforms for simulating or accessing quantum computers, e.g. cloud-based quantum computing

**WARNING**

Group [G06N 10/80](#) is incomplete pending reclassification of documents from group [G06N 10/00](#).

Groups [G06N 10/00](#) and [G06N 10/80](#) should be considered in order to perform a complete search.

**20/00 Machine learning**

- 20/10
- using kernel methods, e.g. support vector machines [SVM]
- 20/20
- Ensemble learning

**99/00 Subject matter not provided for in other groups of this subclass**

- 99/007
- {Molecular computers, i.e. using inorganic molecules (using biomolecules [G06N 3/002](#))}