

Soft Computing Techniques In Engineering Applications Studies In Computational Intelligence

Computational intelligence

machine intelligence into hard and soft computing techniques, which are used in artificial intelligence on the one hand and computational intelligence on the

In computer science, computational intelligence (CI) refers to concepts, paradigms, algorithms and implementations of systems that are designed to show "intelligent" behavior in complex and changing environments. These systems are aimed at mastering complex tasks in a wide variety of technical or commercial areas and offer solutions that recognize and interpret patterns, control processes, support decision-making or autonomously manoeuvre vehicles or robots in unknown environments, among other things. These concepts and paradigms are characterized by the ability to learn or adapt to new situations, to generalize, to abstract, to discover and associate. Nature-analog or nature-inspired methods play a key role, such as in neuroevolution for Computational Intelligence.

CI approaches primarily...

Soft computing

real-world applications, and ethical artificial intelligence. The development of soft computing dates back to the late 20th century. In 1965, Lotfi Zadeh

Soft computing is an umbrella term used to describe types of algorithms that produce approximate solutions to unsolvable high-level problems in computer science. Typically, traditional hard-computing algorithms heavily rely on concrete data and mathematical models to produce solutions to problems. Soft computing was coined in the late 20th century. During this period, revolutionary research in three fields greatly impacted soft computing. Fuzzy logic is a computational paradigm that entertains the uncertainties in data by using levels of truth rather than rigid 0s and 1s in binary. Next, neural networks which are computational models influenced by human brain functions. Finally, evolutionary computation is a term to describe groups of algorithm that mimic natural processes such as evolution...

Evolutionary computation

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Evolutionary computation from computer science is a family of algorithms for global optimization inspired by biological evolution, and the subfield of artificial intelligence and soft computing studying these algorithms. In technical terms, they are a family of population-based trial and error problem solvers with a metaheuristic or stochastic optimization character.

In evolutionary computation, an initial set of candidate solutions is generated and iteratively updated. Each new generation is produced by stochastically removing less desired solutions, and introducing small random changes as well as, depending on the method, mixing parental information. In biological terminology, a population of solutions is subjected to natural selection (or artificial selection), mutation and possibly recombination...

Lateral computing

hybrid computing. The degree of membership for lateral computing techniques is greater than 0 in the fuzzy set of unconventional computing techniques. The

Lateral computing is a lateral thinking approach to solving computing problems.

Lateral thinking has been made popular by Edward de Bono. This thinking technique is applied to generate creative ideas and solve problems. Similarly, by applying lateral-computing techniques to a problem, it can become much easier to arrive at a computationally inexpensive, easy to implement, efficient, innovative or unconventional solution.

The traditional or conventional approach to solving computing problems is either to build mathematical models or to use an IF- THEN -ELSE structure. For example, a brute-force search is used in many chess engines, but this approach is computationally expensive and sometimes may arrive at poor solutions. It is for problems like this that lateral computing can be useful to form...

Outline of computer science

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Computer science (also called computing science) is the study of the theoretical foundations of information and computation and their implementation and application in computer systems. One well known subject classification system for computer science is the ACM Computing Classification System devised by the Association for Computing Machinery.

Computer science can be described as all of the following:

Academic discipline

Science

Applied science

Applications of artificial intelligence

Artificial intelligence is the capability of computational systems to perform tasks typically associated with human intelligence, such as learning, reasoning

Artificial intelligence is the capability of computational systems to perform tasks typically associated with human intelligence, such as learning, reasoning, problem-solving, perception, and decision-making. Artificial intelligence (AI) has been used in applications throughout industry and academia. Within the field of Artificial Intelligence, there are multiple subfields. The subfield of Machine learning has been used for various scientific and commercial purposes including language translation, image recognition, decision-making, credit scoring, and e-commerce. In recent years, there have been massive advancements in the field of Generative Artificial Intelligence, which uses generative models to produce text, images, videos or other forms of data. This article describes applications of...

Glossary of artificial intelligence

intelligence techniques. computational humor A branch of computational linguistics and artificial intelligence which uses computers in humor research

This glossary of artificial intelligence is a list of definitions of terms and concepts relevant to the study of artificial intelligence (AI), its subdisciplines, and related fields.

Related glossaries include Glossary of computer science, Glossary of robotics, Glossary of machine vision, and Glossary of logic.

Neuromorphic computing

Neuromorphic computing is an approach to computing that is inspired by the structure and function of the human brain. A neuromorphic computer/chip is

Neuromorphic computing is an approach to computing that is inspired by the structure and function of the human brain. A neuromorphic computer/chip is any device that uses physical artificial neurons to do computations. In recent times, the term neuromorphic has been used to describe analog, digital, mixed-mode analog/digital VLSI, and software systems that implement models of neural systems (for perception, motor control, or multisensory integration). Recent advances have even discovered ways to detect sound at different wavelengths through liquid solutions of chemical systems. An article published by AI researchers at Los Alamos National Laboratory states that, "neuromorphic computing, the next generation of AI, will be smaller, faster, and more efficient than the human brain."

A key aspect...

Artificial intelligence

Artificial intelligence (AI) is the capability of computational systems to perform tasks typically associated with human intelligence, such as learning

Artificial intelligence (AI) is the capability of computational systems to perform tasks typically associated with human intelligence, such as learning, reasoning, problem-solving, perception, and decision-making. It is a field of research in computer science that develops and studies methods and software that enable machines to perceive their environment and use learning and intelligence to take actions that maximize their chances of achieving defined goals.

High-profile applications of AI include advanced web search engines (e.g., Google Search); recommendation systems (used by YouTube, Amazon, and Netflix); virtual assistants (e.g., Google Assistant, Siri, and Alexa); autonomous vehicles (e.g., Waymo); generative and creative tools (e.g., language models and AI art); and superhuman play...

Outline of artificial intelligence

*intelligence Narrow AI Level of precision and correctness Soft computing
"Hard" computing Level of intelligence Progress in artificial intelligence
Superintelligence*

The following outline is provided as an overview of and topical guide to artificial intelligence:

Artificial intelligence (AI) is intelligence exhibited by machines or software. It is also the name of the scientific field which studies how to create computers and computer software that are capable of intelligent behavior.

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