

Institute of Engineering, Jiwaji University

Subject: Soft Computing

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Submitted by:

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Soft computing

- Soft computing is an emerging approach of computing.
- It gives ability to explore and learn in the atmosphere of uncertainty and imprecision.
- It is used to solve complex problem in real time, or difficult to model mathematically.

- The idea of soft computing was given by Lotfi A. Zadeh in 1981.

According to him :

“It is the fusion of the fields of Fuzzy Logic, Neuro Computing , Evolutionary , Genetic computing and Probabilistic Computing. It is a collection of methodologies designed to model and enable solutions to real-world problems which are not modeled or difficult to model mathematically. The aim of Soft computing is to exploit the tolerance for imprecision, uncertainty, approximate reasoning.”

Hard Computing vs Soft Computing

- Soft Computing is a modern approach based on the idea imprecision, uncertainty, partial truth and approximation.
- Hard Computing is a conventional approach requires accuracy, certainty, and inflexibility.

- Soft Computing is based on fuzzy logic, neural sets, and probabilistic reasoning whereas Hard Computing is based on binary logic, crisp system, numerical analysis and crisp software.
- Hard computing works on exact input data whereas soft computing works on noisy and ambiguous data.
- Hard computing performs sequential computations and soft computing performs parallel computations .

- Hard computing provides accurate results whereas soft computing provides approximate results.
- Hard computing approach is deterministic whereas soft computing is probabilistic or stochastic.
- Hard computing uses two-valued logic, on the other hand soft computing uses multi-valued logic.

Soft Computing Techniques

- **Neural Networks (ANN):**

An artificial neural network is an attempt to emulate a network of neurons that makes a human brain so that computers can be able to learn things and make optimal decision. A neural network works in the same way as human brain does.

A “neuron” in a neural network is a mathematical function that collects and classifies information according to a specific architecture.

- **Fuzzy logic:**

Fuzzy logic make decisions based on imprecise information.

Fuzzy logic is designed to be considered the best possible decision by considering all available information.

Fuzzy logic is derived from fuzzy set theory and finds an approximate rather than a definite or precise pattern.

- **Genetic Algorithm :**

A genetic algorithm is a search heuristic that is inspired by Charles Darwin's theory of natural evolution. This algorithm reflects the process of natural selection where the fittest individuals are selected for reproduction in order to produce offspring of the next generation.

Application of Soft computing

- Medical diagnosis
- Computer vision
- Hand written character recondition
- Pattern recognition
- Machine intelligence
- Weather forecasting
- Network optimization and many more.