

SOFT COMPUTING
2024OD137
DEPARTMENT
OF
ELECTRONICS AND INSTRUMENTATION ENGINEERING
SENTHILKUMAR S **7376211EI139**

INTRODUCTION

In the field of artificial intelligence known as "Soft Computing," complicated real-world issues that are frequently marked by uncertainty, ambiguity, and imprecision are approximated and solved. It includes a number of computational strategies meant to imitate how humans make decisions. A clear explanation of Soft Computing, its elements, and its applications is given in this study.

CHARACTERISTICS OF SOFT COMPUTING

For real-world issues, soft computing offers an approximative but exact answer. Soft computing techniques are adaptable, therefore any change in the environment has no impact on the ongoing operation. Soft computing is founded on the idea of learning from experimental data. It implies that soft computing can solve a problem without using a mathematical model. Soft computing offers approximations to answers that traditional and analytical models are unable to provide, assisting users in finding solutions to real-world

issues. It is based on genetic algorithms, fuzzy logic, machine learning, artificial neural networks, and expert systems.

USE CASES FOR SOFT COMPUTING

Soft computing is applied in a number of different fields. Following is a list of some of them

- It is frequently utilized in games like poker and checkers.
- in kitchen gadgets like the rice cooker and microwave.
- the four most often used home appliances—the washer, heater, refrigerator, and air conditioner.
- In addition to all of these applications, it is used in robotics work (Emotional per Robot form).
- Soft computing is frequently used for image processing and data compression.
- used to identify handwriting.

SOFT COMPUTING IS NECESSARY

Real-world situations can defy typical computing or analytical models to offer a solution. In that instance, we need an additional technique, such as soft computing, to get a rough answer.

- Mathematical issues requiring exact solutions are resolved via hard computing. Some issues with real-world solutions are not addressed. Soft computing hence provides assistance for real-world issues for which a clear solution is lacking.
- Soft computing is useful when traditional mathematical and analytic models fall short. For instance, soft computing can be used to map even the human mind.

- Mathematical issues can be solved using analytical models, which are valid in the best-case scenarios. However, the difficulties in the real world don't exist in an ideal setting

ELEMENTS OF SOFT COMPUTING

Any problems can be resolved effectively using these components. Following are three types of techniques used by soft computing:

- Fuzzy Logic
- Artificial Neural Network (ANN)
- Genetic Algorithms

1. Fuzzy Logic (FL)

Fuzzy logic is simply mathematical logic that attempts to address issues with an undefined and imprecise range of data. It makes it simple to find a variety of accurate conclusions. Fuzzy logic is essentially created to find the best answer to complicated situations using all the information and input data available. The most effective solution finders are thought to be fuzzy logics.

2. Neural Network

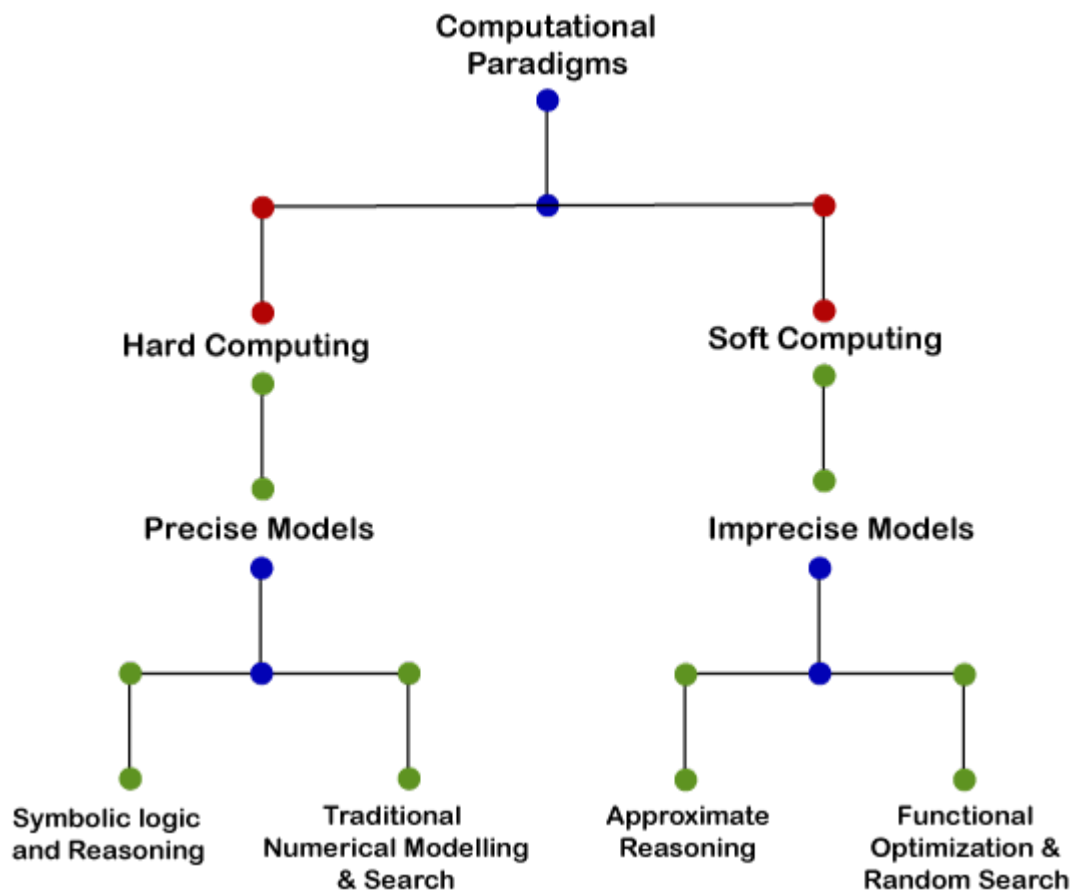
Since the development of neural networks in the 1950s, soft computing has been able to tackle issues that a computer alone cannot. We are all aware that a human brain is much more adept at describing actual situations than a machine. An artificial neural network (ANN) is a machine that can think like a human mind by simulating the network of neurons that make up the human brain. So that they can make decisions like the human brain, a computer or other machine can learn new information. Artificial neural networks (ANNs) are constructed using conventional computer programming and are interconnected with brain cells. It is comparable to the human nervous system.

3. GAs (Genetic Algorithms)

Nearly all of the genetic algorithm's inspirations come from nature. There is no genetic algorithm based on search-based algorithms, which have their roots in the theory of genetics and natural selection.

HARD VS SOFT COMPUTING

To address specific issues, hard computing makes use of already-existing mathematical techniques. It offers a clear and exact solution to the issue. Hard computing can be seen in any numerical issue. Soft computing, on the other hand, takes a different approach than hard computing. We calculate solutions to the current challenging challenges via soft computing. Soft computing also produces results that are not precisely calculated or delivered. They have a hazy, vague quality.



ADVANTAGES

Flexibility: Soft Computing approaches work effectively for issues with missing or ambiguous data. They are more effective than conventional strategies at dealing with ambiguity and imprecision.

Adaptability: Soft Computing models can change as circumstances do and gain knowledge from their mistakes. They are useful for dynamic and changing systems because of their versatility.

Solving Complex Problems: Soft Computing approaches are excellent at handling difficult categorization, optimization, and decision-making issues that may involve a number of variables and restrictions.

CONCLUSION

To handle a variety of real-world issues, the multidisciplinary discipline of "soft computing" incorporates neural networks, fuzzy logic, evolutionary computation, and swarm intelligence. It is a useful tool in a variety of industries, from manufacturing and communication to healthcare and banking, thanks to its adaptability, flexibility, and capacity for handling uncertainty. To fully utilize the potential of Soft Computing approaches, however, interpretability and computational cost issues must be resolved. Soft Computing is likely to keep being a key factor in determining the direction of artificial intelligence and problem-solving as technology develops.

