

Soft computing and application

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ABSTRACT-The term "soft computing" refers to the discipline of reasoning, thinking, and deduction that acknowledges and makes use of the grouping, membership, and classification of different quantities under investigation that occur in the actual world. Because it does not need exact mathematical definitions and boundaries for the system components, it is an expansion of natural instincts and is capable of handling complicated systems. It varies from hard computation in that it is more accepting of imperfection, ambiguity, and incomplete truth than hard computing is. In essence, the human mind serves as a model for soft computing. The driving premise of soft computing is to achieve tractability, robustness, and low solution cost by taking use of the tolerance for ambiguity, partial truth, and imprecision. Evolutionary computing, artificial neural networks, fuzzy logic, and Bayesian statistics are the key methods used in soft computing. Although each method can be employed independently, the complimentary character of the techniques is a key benefit of soft computing. When combined, they can yield answers to issues that are too complicated or intrinsically noisy for traditional mathematical techniques to solve. Soft computing applications have demonstrated two key benefits. In the beginning, it made it possible to solve nonlinear issues for which statistical methods are not available. Second, it brought human knowledge into the disciplines of computing, such as cognition, identification, comprehension, learning, and others.

Keywords -fuzzy logic, Soft computing, ANN and ML

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I. INTRODUCTION

In the real world, there are many issues that are hard to resolve logically or that, while theoretically solvable, are really impractical due to the enormous time and resources needed for calculation. Methods inspired by nature can occasionally be quite efficient and successful for these issues. A near-optimal solution is sometimes sufficient for the majority of practical uses, even though the answers found by these methods are not actually equivalent to the mathematically precise solutions. The term "Soft Computing" refers to these physiologically based techniques. A group of computing approaches are included under the term "soft computing."

Soft computing is built on both organic and artificial concepts. As a computational intelligence, it is known. Hard computing is how it differs from traditional computing. To achieve tractability, approximations, resilience, cheap solution cost, and better resemblance to reality, it is necessary to tolerate imprecision, ambiguity, and partial truth. In actuality, the human mind serves as a model for soft computing. It refers to a group of computational methods from computer science, A.I., and machine learning that are used in engineering fields such as electric power systems, power electronics, motion control, heating and cooling communication networks, mobile robots, and others.

SOFT COMPUTING

Soft computing is a collaboration where each member brings a unique approach to solving problems in their area of expertise. According to this viewpoint, the main soft computing approaches are complimentary rather than competitive. The capacity of soft computing to naturally produce hybrid systems based on the fusion of constituent technologies is actually its primary trait. We may use domain knowledge and empirical data in conjunction with this integration's complementing reasoning and searching techniques to create adaptable computing tools and tackle challenging issues.

Combining hard computing with soft computing, each of which has advantages and limitations of its own, is hybrid computing. Hybrid computing allows users to overcome their own constraints and benefit from the benefits of both approaches. Many categorization, prediction, and control issues have been addressed using hybrid soft computing models.

APPLICATIONS

Soft computing technologies have developed as one of the most promising instruments that may offer guidance and practical solutions. Soft computing methods are employed in several fields

Agricultural Engineering

The engineering specialty known as agricultural engineering uses engineering science and technology to produce and prepare food. Animal and plant biology, mechanical, civil, electrical, and chemical engineering concepts, as well as an understanding of agricultural principles, are all combined in agricultural engineering.

Computer Engineering

Electrical engineering and computer science are two disciplines that must be integrated in order to create computer systems. Instead of just learning software development or electronic engineering, computer engineers also receive instruction in software design and hardware-software integration. The construction of individual microprocessors, personal computers, and high - performance computing, as well as circuit design, are all tasks that computer scientists are involved in. This area of engineering focuses about how computer systems function as a whole as well as how they fit into a larger context.

Data Mining

The computing process of finding patterns in massive data sets using techniques at the interface of artificial intelligence, machine learning, stats, and database systems is known as data mining. The main objective of data mining is to take information from data and organise it so that it can be used in other ways.

Signal Processing

Systems engineering, electrical engineering, and applied mathematics all have subfields called signal processing that deal with operations on, analysis of, or measurements of time-changing or spatially varying physical data. Signals can be in the form of sound, pictures, sensor data (such as electrocardiograms), telecommunication transmitting signals, and many other types of data.

Medical diagnosis

Medical diagnosis includes both the act of seeking to detect or determine a potential disease and the conclusion drawn as a result of this effort. According to statistics, categorization tests are a part of the diagnostic process.

II. CONCLUSION

Computer scientists need to be conscious of their responsibilities and prepare for the increased development of soft computing in the future as the development of soft computing advances in numerous fields, including physics, chemistry, biology, and material science. Various aspects of soft computing have been discussed in this study. Soft computing's impact is expected to rise over the next few years, according to successful applications and quick expansion. It promotes the incorporation of soft computing methods and equipment into both standard and cutting-edge applications. Those computer scientists who are eager to contribute their research to the field of soft computing should find this light review useful.

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