Introduction to Hard Computing and Soft Computing

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Abstract: The act of processing data, calculation to complete a given task from the use computer technology is Computing. Hard computing result is always precise and it's control actions are unambiguous. Hard computing is suitable for mathematical problems. While solving real world problems it consumes a large amount of computation time as well as high solution cost. One of the applications of hard computing is mobile robot coordination. Whereas Soft computing is that field of computer science which resembles human brain, it is something that exploits the tolerance of not getting precise results and uncertainty to achieve low solution cost. Soft computing includes techniques like Fuzzy logic, Genetic computing and Neural network. One of the applications of soft computing is handwriting recognition. This paper will discuss about features, advantages and disadvantages of soft computing and hard computing. Also, the paper aims at discussing one application of each hard computing and soft computing. This paper reviews some basic techniques and applications of soft computing and hard computing.

Keywords- computing, soft computing, hard computing, fuzzy logic, recognition

Introduction

Hard Computing: The traditional method of computing is hard computing, It requires a lots of computation time. The approach of hard computing is to produce a deterministic, accurate and guaranteed result. Hard computing deals with binary and crisp logic which requires the exact input data sequentially. It uses existing mathematical algorithm to solve certain problems. Any numerical problem is an example of hard computing. While solving real world problems it consumes a large amount of computation time as well as high solution cost.

Soft Computing: The reverse of hard computing is soft computing. The approach of soft computing is to enables solutions for problems that may be either unsolved or just too time consuming by using means other than computer, with human mind as a role model. Soft computing is tolerant of partial truths, uncertainty, imprecision and approximation, unlike traditional computing models**.** It provides cost-effective solutions to the complex real-life problems for which hard computing solution does not exist.

Features

Hard Computing:-

- It has a deterministic nature.
- It uses the two-valued logic.
- It works on exact data.
- Its features include precision and categoricity
- It is used to perform sequential computations.

Soft Computing:-

- It has a stochastic nature
- It uses multivalued logic.
- It generally works on ambiguous and noisy data.
- It consists of approximation and dispositionality.
- It can be used to perform parallel computations.

Techniques

Hard Computing: - Traditional computing techniques based on principles of precision, uncertainty and rigor. The problems based on analytical model can be easily solved using such techniques. Real world problems which deal with changing of information and imprecise behavior can- not be handled by hard computing techniques.

Soft computing: - Soft Computing is based on techniques such as fuzzy logic, genetic algorithms, artificial neural networks, machine learning, and expert systems. . Real world problems which deal with changing of information and imprecise behavior can be handled by soft computing techniques.

Applications

Hard Computing: - One of the applications of hard computing is mobile robot coordination. The basic functions of a mobile robot include the ability to move and explore, transport, and complete complex tasks using an onboard system, like robotic arms.

Soft Computing: - One of the applications of soft computing is handwriting recognition. Handwritten Script Recognition is one of the demanding parts of computer science. It can translate multilingual documents and sort the various scripts accordingly. It uses the concept of "block-level technique" where the system recognizes the particular script from a number of script documents given.

Advantage

Hard Computing: - The outcome of hard computing approach is a warranted, settled, correct result and defines definite management actions employing a mathematical model or algorithm rule.

Soft Computing: - It made solving nonlinear problems, in which mathematical models are not available, possible and it introduced the human knowledge such as cognition, recognition, understanding, learning, and others into the fields of computing.

Disadvantage

Hard Computing: - It is not suitable for real world problems and it Cannot handle imprecision and partial truth.

Soft Computing: - It gives an approximate output value and If a small error occurs the entire system stops working, to overcome its entire system must be corrected from the beginning, which is time taking process.

References

- www.worldofcomputing.net
- www.whatis.techtarget.com
- www.javatpoint.com
- www.tutorialspoint.com
- www.geeksforgeeks.com
- www.researchgate.net
- www.elprocus.com
- www.igi-global.com
- www.wisdomplexus.com
- www.hitechnectar.com
- www.includehelp.com
- www.digitalthinkerhelp.com
- www.en.wikipedia.org
- www.techdiffrences.com