STUDY OF VARIOUS SOFT COMPUTING TECHNIQUES

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ABSTRACTT

His papers aim to the study of various soft computing techniques. Soft computing is a growing field that consists of artificial neural networks, evolutionary computation,fuzzy logic and swarm intelligence. Soft computing, computer science, is mainly deals with that problems whose solutions are hard , unpredictable and uncertain. Soft computing techniques are used to solve various problems.

Keywords- Artificial Neural Network, Genetic Algorithm, Fuzzy Logic, Swarm Intelligence.

I. INTRODUCTION

Soft computing mainly deals with that problems whose solutions are inexact like NP complete problems where no efficient algorithm is built which find out exact solution in polynomial time. Soft computing is different from hard computing like it deals with impercision, partial truth and approximation. The role model for soft computing is the human mind. Soft Computing is a term used in to refer to problems in computer science whose solutions are unpredictable, uncertain and between 0 and 1. Soft computing is used when we don't have enough information about the problem itself.[1][2][3]

1.1 Artificial Neural Network

An artificial neural network (ANN) is an interconnected group of nodes, as shown in Fig.1. Its like human brain, which consists of 10 billion neurons which are interconnected with 60 trillion connections. ANN will try only to mimic a very small part of human brain functions to do very specific task with the help of electronic components and computer softwares.ANN capabilities like nonlinearity, input-output mapping, adaptively, evidential response, fault tolerance, VLSI implement ability and neurobiological analogy.

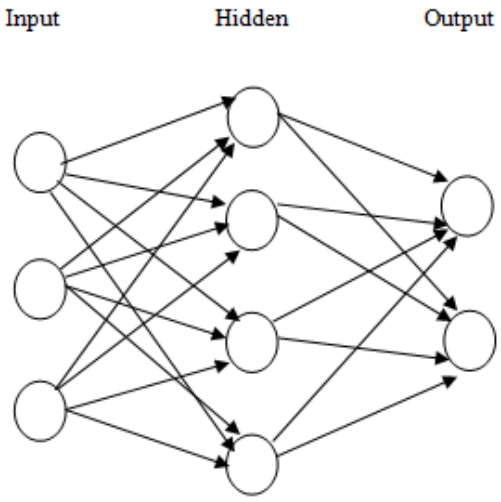

Figure. 1: Neural Network

1.2 Fuzzy Logic

Fuzzy logic deals with reasoning that is approximate rather than fixed and exact. Fuzzy logic variables may have a truth value that ranges in degree between 0 and 1. Fuzzy logic has been extended to handle the concept of partial truth, where the truth value may range between completely true and completely false.[4] In washing machines, concept of fuzzy logic is used, in which according to human mind it works. Fuzzy c-mean algorithm is also based upon fuzzy logic in which object with similar group or color or other thing which grouped them in one cluster. Clusters are made up with the help of any one distance measure method for example eucledian distance or etc. After this, membership function is calculated for each and every object.So, that the relations of each object with other clusters, except that which that is belonging, are evaluated. Membership function is also lies between 0 and 1, means that each object has relation (even though, it is minor or major) with other object.

1.3 Evolutionary Computation

Evolutionary computation, growth in a population. Genetic algorithm is one of the computation techniques. It is a general purpose optimization technique based on principles inspired from the biological evolution using metaphors of mechanisms such as natural selection, genetic recombination and survival of the fittest. [5]Genetic Algorithm, in this approach at random population of organisms are selected then fitness function is calculated for each organism.Parents are selected on the basis of fitness after that children are created through crossovers and mutations of 'DNA'. Use this new population and replace it with the old population.Repeat above steps again and again til best result is not found. It involves basically a four-step process evaluation, reproduction, recombination, and mutation.[6] A well known problem Travelling salesperson is solved with help of Genetic algorithm. In Bioinformatics, Genetic algorithm is used.

1.4 Swarm Intelligence

Swarm intelligence is a approach to problem solving that takes inspiration from the social behaviors of insects and of other animals. Swarm intelligence systems consist typically of a population of simple agents or boids interacting locally with one another and with their environment. The agents follow very simple rules, and although there is no centralized control structure dictating how individual agents should behave, local, and to a certain degree random, interactions between such agents lead to the emergence of "intelligent" global behavior, unknown to the individual agents. Examples in natural systems of SI include ant colonies, bird flocking, animal herding, bacterial growth, and fish schooling.[7]

1.4.1 Particle Swarm Optimization

Particle swarm optimization (PSO) is a population-based stochastic approach for solving continuous and discrete optimization problems.In this, simple software agents, called particles, move in the search space of an optimization problem. The position of a particle represents a candidate solution to the optimization problem at hand. Each particle searches for better positions in the search space by changing its velocity according to rules originally inspired by behavioral models of bird flocking.Particle swarm optimization belongs to the class of swarmintelligence techniques that are used to solve optimization problems.[8]-[22]

1.4.2 Ant Colony Optimization

Ant colony optimiztion is a probabilistic technique for solving computational problems which can be reduced to finding good paths through graphs. Ant colony optimization (ACO) takes inspiration from the foraging behavior of some ant species. These ants deposit pheromone on the ground in order to mark some favorable path that

should be followed by other members of the colony. Ant colony optimization exploits a similar mechanism for solving optimization problems.[23]

II. CONCLUSION

This paper discussed various soft computing techniques,not in detail ,but gives little knowlege about artificial neural networks, fuzzy logic ,Genetic algorithm,Swarm intelligence .From above described techniques one thing is clear that all soft computing techniques are inspired from human ,animal and insects behaviour. Soft computing techniques are basically mimic these and solve various hard problems.

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