Fitness Dependent Optimizer: Inspired by the Bee Swarming Reproductive Process

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Abstract Title:
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Abstract:

Problem Statement:

An optimization algorithm is proposed to solve feature searching problems with large dataset. Instead of searching all the feature combination in a dataset, we find (search) optimal feature based on the fitness value (how optimal is the current solution) and Pace (Velocity of movement from one feature set to another). This optimization algorithm is inspired from the Bee Swarming Process (on observing the reproductive cycle of the bees). It is observed that the Scout Bees gathers important features during their search for a new hive, it then exchange the information among themselves. The feature set that most Bees support is considered the best location. Likewise, in this Algorithm, we are randomly choosing some features and move towards the best by calculation fitness for every bee and comparing. While moving from one feature to another feature , we find a pace (velocity) at which it should change. We find the Pace(velocity), by comparing it with the best Bee feature set. Hence, an optimal solution for a problem is searched with less time. This algorithm is a Evolutionary Heuristic algorithm. It searches a solution by trial and error. It hopes that the solution found is of good quality and corrects its mistake everytime they move. In this algorithm, we could alter the fitness function according to the problem.

Existing Methodologies:

When it comes to efficiency, we compared this algorithm with other Particle Swarm Optimization algorithms like Genetic algorithm (GA), Dragonfly algorithm (DA) and Whale Optimization algorithm (WOA). As a result,in some cases it out performs these algorithms and performs comparably in other cases. It takes comparitively less amount of time than the traditional algorithms like Gradient-based and quadratic algorithms.

Real-world Applications:

We can apply this algorithm in different real-world applications. One such example is, when we have a priority of buildings in a city, we can use this alogrithm to choose the optimal location to build a apartment(flat) in that city. ie, the optimal location is nearer to schools, IT parks, Entertainment Malls,etc . Other examples are to find optimal Aperiodic Antenna Array Designs and Frequency Modulated Sound Waves.