Reading Assignment homework 2

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- Title：Honey Bees Inspired Optimization Method: The Bees Algorithm
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In the Bees Algorithm, it mimics the foraging behavior of honey bees. The algorithm starts with sending *n* scout bees randomly to select some sites which food source. Each selected site can be thought as a point in the search space. When a scout bee visits a food source, it report the quality of the visited location via the fitness function, waggle dance. Then, sorting the quality, that is fitness value, from the highest to lowest. We can classify these sites into two groups : best sites and non-best sites. Best sites are also classified into two sub-groups : elite sites and non-elite sites. Other bees are recruited to search the fitness landscape in the neighborhood of the highest-ranking locations which means to explore other potential solutions close to those solutions with high fitness value. The neighborhood can be thought as flower patch. Then, it will also evaluate the fitness value of each new locations. For those non-best sites, just like a global search process, it will allocate the rest of the bees to evaluate the fitness value of each non-best site. After all, the overall locations are sorted according to their fitness value and process runs until the global optimum is found.

According to this paper, we can conclude some advantages and disadvantages of Bees algorithm.

- Advantages
  - Have both local search and global search
  - Can be used for both combinatorial optimization and continuous

optimization problems

- Easy to implement with several optimization problems
- Available for hybridization combination with other algorithms

- Disadvantages
  - Random initialization
  - The algorithm has several parameters
  - Parameters need to be tuned

On the other hand, Ant algorithm also has many parameters and the problem is that if we start with improper selection of initial values may lead to stagnation around local optimum and failure to obtain the optimal solution. Another disadvantage of Ant algorithm is that it is not efficient for dealing with large-scale combinatorial problems because of its time complexity. Ant algorithm also can't deal with continuation problems, but at most of path optimization problems, it will have good performance because of its strong robustness, positive feedback, and parallelism.

Ant algorithm are suitable to deal with combinatorial optimization problems such as stochastic problems, multi-targets and parallel implementations. It also can be used to solve most of path optimization problems like finding near-optimal solutions to the travelling salesman problem. Scheduling problem and Vehicle routing problem are also suitable to Ant algorithm. On the other hand, Bees algorithm can solve not only combinatorial optimization but also continuous function optimization problems. Thus, it is widely used in various problem such as training neural networks for pattern recognition, finding multiple feasible solutions to a preliminary design problem. It also has very good performance with high-dimension problems, such as 6-dimensional optimization problems or even higher.