

its colony. When a scout arrives at the colony, it goes inside and announces its presence by the wing vibrations. This means that it has a message to communicate. If it has found a nearby source of nectar or pollen, it undergoes a circular dance. The nearby bees follow it through this circular dance and smell it for the identity of the flowers. They listen to the intensity of the wing vibrations to indicate the value of the food source. If the source is so close, no directions are given. Alternatively, if the flower source is a long ways off, careful directions must be given.

The abstract convention that the scout makes is that the up position on the comb is the position of the sun. Because bees can see polarized light, they can tell sun position without actually seeing the sun. The scout dances in a precise angle from the vertical. This equals to the horizontal angle of the sun with reference to the colony exit with the location of the food source. Next the scout bee must tell the other bees how far away the flower source is. This is done by wagging the abdomen from side to side. The slower the wagging, the further away is the distance of the food flower.

Movement of the Scouts

- The movement of the scout bees follows equation.

$$\theta_{ij} = \theta_{j\min} + r \cdot (\theta_{j\max} - \theta_{j\min})$$

r : A random number and $r \in [0,1]$

4.2 The Behaviour of Forger Scenario

The bees in the colony closely follow the scout to learn these directions, and also learn the odour of the flower on scout bee, so they can find the flower when they arrive at the source location. Because the sun is moving in the sky, the bees should use an accurate clock sense to adjust for the changing sun position with reference to the food source and the colony exit. Even more remarkable, if a trained bee is removed from the colony to another location where the flower is not visible, but the colony is, the bee does not return to the colony to get its bearing, but reads sun position, and triangulates, and flies directly to the flower [3]. Subsequently, the forager bees take a load of nectar from the source and return to the colony and unload the nectar to the store of food.

Foraging requires energy and the honeybee's evaluation as to where, what, and how long to forage are all related to the economics of energy consumption and the net gain of food to the colony. Generally bees fly only as far as necessary to secure an acceptable food source from which there is a net-gain. Therefore, these are the factors that influence foraging behavior and determine profitability. The net rate of energy intake is defined as the energy gained while foraging minus the energy spent on foraging, divided by time spent foraging [5].

4.3 Movement of the Onlookers

- Probability of Selecting a nectar source:

$$P_i = \frac{F(\theta_i)}{\sum_{k=1}^s F(\theta_k)}$$

P_i : The probability of selecting the i^{th} employed bee
 S : The number of employed bees
 θ_i : The position of the i^{th} employed bee
 $F(\theta_k)$: fitness value

4.4 Movement of the Forgers

- Calculation of the new position:

$$x_{ij}(t+1) = \theta_{ij}(t) + \phi(\theta_{ij}(t) - \theta_{kj}(t))$$

x_i : The position of the onlooker bee

t : The iteration number

θ_k : The randomly chosen employed bee.

j : The dimension of the solution

$\phi(\bullet)$: A series of random variable in the range $[-1,1]$

5. Conclusion

This paper proposes an algorithm for the Artificial Bee Colony system according to the two scenarios of scouting and forging processes. Artificial Bee Colony (ABC) algorithm has opened up a vast stage for WSN protocol suite design. Like any swarm intelligent scheme, they are compatible to any stage of a WSN design and implementation, which makes them an attractive choice as the base. A random selection process carried out by scouts. The algorithm outperformed other techniques in terms of speed of optimisation and accuracy of the obtained results. The proposed algorithm can be applied to many combinatorial optimization problems, dynamic problems in real variables, stochastic problems, multi-targets; data mining search engine crawling, parallel implementations.

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