

Synchronization of Fireflies can Improve or Inspire Robotic Swarm

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DESCRIPTION

Despite their simple brains, synchronized fireflies have something to show us about AI. A recent discovery on the insect's amazing light shows could help researchers acquire fresh insight into swarm robotics. It seems, the synchronized fireflies' light displays are even more subtle than scientists realized, and it's to try to with the insect's three-dimensional positioning. They found that fireflies behave differently after they are alone versus in groups. In seems, synchronized fireflies what their neighbors do, rather than blinking consistent with any inherent rhythm. Then they modify their blinking pattern to match those around them.

There are over 2,000 species of fireflies – which are not actually flies. In some parts of the country, they're called lightning bugs. But, they don't seem to be true bugs either. They're nocturnal beetles. Unfortunately, many fireflies face extinction due to habitat loss, light pollution, and pesticides.

Nature-inspired methodologies are among the foremost powerful algorithms for optimization problems. The Firefly Algorithm (FA) may be a novel nature-inspired algorithm inspired by the social behavior of fireflies. By idealizing a number of the flashing characteristics of fireflies, a firefly-inspired algorithm was presented.

These algorithms are supported a selected successful mechanism of a biological phenomenon of Mother Nature so as to realize optimization, like the family of fireflies algorithms, where the finding of an optimal solution. Although the important purpose and therefore the details of this complex biochemical process of manufacturing this flashing light continues to be a debating

issue within the scientific community, many researchers believe that it helps fireflies for locating mates, protecting themselves from their predators and attracting their potential prey. within the firefly algorithm, the target function of a given optimization problem is related to this flashing light or candlepower which helps the swarm of fireflies to maneuver to brighter and more attractive locations so as to get efficient optimal solutions.

Multiple conflicting objectives arise naturally in most real-world combinatorial optimization problems. Several principles and methods are developed and proposed for over a decade so as to resolve problems. Because it is incredibly difficult to effectively handle with all the conflicting objective functions, several methods are developed for this purpose, like the utility function method and therefore the goal attainment method. In most of those methods, the multi objective problem is transformed into a single-objective problem, then a collection of optimal solutions is generated, and a few additional criterion or rule to pick one particular Pareto optimal solution is employed as an answer of the multi objective problem.

The goal attainment SQP method is truly a hybrid method which mixes the Goal Attainment (GA) method with the Sequential Quadratic Programming (SQP). Particularly, a multi objective non-linear optimization problem is initially reformulated by the goal attainment method so because it may be utilized by the Sequential Quadratic Programming method (SQP) so as to optimize it. This hybrid method has been successfully applied by many scientists as efficient thanks to solve many optimization problems. It constitutes a highly effective and state-of-the-art technique to get the most effective compromise solution in a very multi objective problem.

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