# Artificial Fish Swarm Algorithm

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## DESCRIPTION

AFSA (Artificial Fish-Swarm Algorithm) is perhaps the best technique for enhancement among the swarm intelligence algorithms. This algorithm is propelled by the collective development of the fish and their different social behaviors. In view of a series of instinctive behaviors, the fish consistently try to maintain their colonies and accordingly demonstrate intelligent behaviors. Searching for food, immigration and managing risks all occur in a social form and interactions between all fish in a gathering will bring about an intelligent social behavior. This algorithm has many benefits including high convergence speed, adaptability, flexibility fault tolerance and high precision. Most species of animals show social behaviors. In certain species this is the top member from the group which drives all members from that gathering. For instance, this conduct is very apparent in lions, monkeys and deer. However, there are different kinds of creatures which live in groups but have no leader. In this type of creatures each member has a self-organizer behavior which enables it to move around its environment and response to its natural needs with no need to leader like birds, fishes and sheep droves. This type of creatures has no knowledge about their group and environment all things being equal, they can move in the environment through exchanging information with their adjoining members. This simple interaction connection among particles makes group behavior more sophisticated as if we are looking for a particle in a wide environment. This data considers Artificial Fish Swarm Optimization (AFSO), a moderately recent addition to the field of natural computing, that has components inspired by the social behaviors of natural swarms, and associations with evolutionary computation. AFSO has discovered wide-spread application in complex optimization domains, and currently a

significant exploration topic, offering an alternative to the more established evolutionary computation techniques that may be applied in many of the same domains. The basic idea of the AFSO is to emulate the fish behaviors, for example, praying, swarming, and following with local search of fish individual for reaching the global optimum. The environment where an AF lives is chiefly the solution space and is the states of other AFs. Its next behavior depends on its current state and local environmental state (including the quality of the question solutions at present and the states of nearby companions). An AF would influence the environment through its own activities and its companions' activities.

A new evolutionary computation technique, AFSO was first proposed in 2002. AFSO possess similar attractive features of Genetic Algorithm (GA) such as independence from gradient information of the objective function, the ability to solve complex non-linear high dimensional problems. Additionally, they can accomplish faster convergence speed and require few boundaries to be adjusted. Whereas the AFSO does not possess the crossover and mutation processes used in GA, so it could be performed more easily. AFSO is also an optimizer based on population.

Artificial Fish (AF) is a fictitious entity of true fish, which is utilized to carry on the analysis and clarification of problem, and can be realized by utilizing animal ecology concept. With the aid of the object-oriented analytical method, we can regard the artificial fish as an entity encapsulated with one's own data and a series of behaviors, which can acknowledges amazing information of environment by sense organs, and do stimulant response by the control of tail and fin. The environment where the artificial fish lives are principally the solution space and the states of other artificial fish.

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