Swarm Intelligence: An Intelligent Way of Problem Solving

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Abstract:

With the development of advanced technology, computational requirements have become high. Usually, for high computational needs, traditional algorithms become infeasible. In such case, some intelligent way of problem solving is required and swarm intelligence is one of them. Social creatures, like birds, fishes, ants, bees, termites etc, exhibit an intelligent social behavior during the search of food or protecting themselves from predators. This intelligent social behavior is usually, referred as Swarm Intelligence. Swarm Intelligence may be defined as, "*When a group of active, dynamic, and stupid (with no inherent knowledge) members tries to solve complex tasks with collaborative, trial and error strategy, then the emerged behavior is known as Swarm Intelligence*". Researchers have always been fascinated with swarm intelligence and applied this to develop some advanced intelligent algorithms to solve the problems where either traditional approaches fail or infeasible to use. Particle Swarm Optimization (PSO), Ant Colony Optimization (ACO), Artificial Bee Colony Algorithm (ABC), Bacterial Foraging Optimization (BFO) and Spider Monkey Optimization (SMO) are some of the algorithms based on the principles of swarm intelligence.

The talk comprises some basic principles of swarm intelligence, and demonstrates how they are applied to develop intelligent algorithms, particularly, PSO and SMO.

Brief Bio:

Dr. Jagdish Chand Bansal is an Associate Professor at South Asian University New Delhi and Visiting Faculty at Maths and Computer Science, Liverpool Hope University UK. Dr. Bansal has obtained his Ph.D. in Mathematics from IIT Roorkee. Before joining SAU New Delhi he has worked as an Assistant Professor at ABV-Indian Institute of Information Technology and Management Gwalior and BITS Pilani. His Primary area of interest is Swarm Intelligence and Nature Inspired Optimization Techniques. Recently, he proposed a fission-fusion social structure based optimization algorithm, Spider Monkey Optimization (SMO), which is being applied to various problems from engineering domain. He has published more than 60 research papers in various international journals. He is the series editor of the book series Algorithms for Intelligent Systems (AIS) published by Springer. He is the editor in chief of International Journal of Swarm Intelligence (IJSI) published by Inderscience. He is also the Associate Editor of IEEE ACESSS published by IEEE and ARRAY published by Elsevier. He is the steering committee member and the general chair of the annual conference series SocProS. He is the general secretary of Soft Computing Research Society (SCRS). He has also received Gold Medal at UG and PG level.

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