

UPB - A&C - Master in Artificial Intelligence
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Swarm intelligence algorithms represent a class of algorithms inspired from collective behaviours that can be found in nature: birds, fish, ants, felines, bees,

These algorithms can be used for solving optimization problems. The solution found by such an algorithm is an approximation (usually, a good approximation) of the exact solution of the problem. They are fast algorithms, but they obtain only an approximation of the solution.

From the historical point of view [1], the first two swarm intelligence algorithms were: Ant Colony Optimization (1991, inspired from the behaviour of ants) and Particle Swarm Optimization (1995, inspired from the behaviour of birds and fish). **Even today they are very influential in this research area.**

The simplest application of the swarm intelligence algorithms is to find the maximum / minimum of an optimization function ($f : \mathbb{R}^n \rightarrow \mathbb{R}$). This application is useful for two purposes:

- 1) it helps researchers and practitioners to tests, understand and compare various swarm intelligence algorithms;
- 2) it helps researchers to develop new swarm intelligence algorithms or new variants of the existing algorithms.

Proposed research topics:

- 1) Develop new variants of the Ant Colony Optimization algorithm: **1 student**
- 2) Develop new variants of the Particle Swarm Optimization algorithm: **1 student**

References

[1] M. Dorigo and M. Birattari (2007), "Swarm intelligence", Scholarpedia, 2(9):1462, see http://www.scholarpedia.org/article/Swarm_intelligence