UPB - A&C - Master in Artificial Intelligence
Andrei Mogoş - Research Topics
(email: andrei.mogos@cs.pub.ro)

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 ($f : R^n \rightarrow R$). 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 algorithm called Artificial Bee Colony [2], an algorithm inspired from the behaviour of bees: **1 student**
2) Develop new variants of the algorithm called Bees Algorithm [3], an algorithm inspired from the behaviour of bees: **1 student**

References
[1] M. Dorigo and M. Birattari (2007), "Swarm intelligence", Scholarpedia, 2(9):1462, see http://www.scholarpedia.org/article/Swarm_intelligence
[2] D. Karaboga and B. Basturk, "A Powerful and Efficient Algorithm for Numerical Function Optimization: Artificial Bee Colony (ABC) Algorithm", Journal of Global Optimization, vol. 39, 2007, pp. 459-471 (available on the Internet)
[3] D.T. Pham, A. Ghanbarzadeh, E. Koc, S. Otri, S. Rahim and M. Zaidi, "The Bees Algorithm – A Novel Tool for Complex Optimisation Problems", Proceedings of the 2nd International Virtual Conference on Intelligent Production Machines and Systems (IPROMS 2006), 3-14 July 2006, pp. 454-459 (available on the Internet)