

# Particle Swarm Optimization and Social Interaction

Final Proposal

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The main goal of this project is to create a basic Particle Swarm Optimization(PSO) problem and try solving it using various techniques of social interaction between members of the swarm. Hopefully the swarm will be more efficient with different types of social interaction and will be able to more quickly find the optimal solution to the problem.

Particle Swarm Optimization is a relatively new swarm intelligence technique. It was first created in 1995, inspired from flocks of birds or schools of fish. It is a good technique because it is inexpensive, both in time and memory. PSO is also used in n-dimensional optimization problems, because it is relatively easy to implement. Some research has been done in the field, with regard to social interaction at a basic level, but the results have not been as effective as the basic swarm.

The languages that will be used for this project will be C primarily. If the problem needs to be shown graphically, OpenGL will also be used. First, the PSO program will be written without any extra social interaction. Then different types of social interaction will be used to simulate various forms of interaction, including single influenced swarms, fully informed swarms, and no influence swarms.

In order to test the programs (with and without social interaction), the programs will need to be tested in different optimization problems, and the number of iterations until a certain minimum error is reached will be the test's benchmark. This may cause to be ineffective however, due to the fact that random numbers must be used by the optimization. An average must therefore be taken to decide how optimal a algorithm is. This method also does not include the actual running time of the program which could differ significantly by interaction to interaction.

Hopefully, one set of social interaction will turn out to be the best in terms of iterative steps. An iterative comparison wouldn't be helpful in determining which is more cost effective in time or memory however, so a different method will need to be used.