### Introduction

When we talk about evolutionary computation we talk about algorithms. The finders of these algorithms have taken biological evolution as a source of inspiration. The algorithms are based on Darwin’s idea of selection and survival of the fittest. Nature is imitated by creating a structure of candidate solution as parents have the possibility to reproduce . The new generation is due to this based on the chosen parents getting variation by different types of combining the parents and small random changes, mutation. The new population is now analysed by a fitness function. Solutions that don’t fit this function are removed in the hope to come closer to a global optimal solution.

This method is used in this report. Four different, unknown functions will be optimized using different evolutionary algorithms. Each function returns a score value and a runtime. The optimal return value is a score of 10. For each function two questions will be solved: what is the best evolutionary algorithm to evolve this function and what are the parameters that are these algorithms require.

The Evolutionary algorithms

Tournament selection

In tournament selection the population of candidate solutions is randomly divided into smaller subgroups: tournaments. For each tournament, one or more winners are selected based on the fitness function. The selected winners have then a possibility to reproduce by crossover to generate a new generation.

Particle swarm optimization

The idea of particle swarm is that all candidate solutions, or particle, have an position and an direction in the search space. For each particle its fitness is calculated. The particles direction depends on the best known position of all the other particles in the search space and their own best known position. So will the whole population of particles eventually all move into a global optimum.

Differential evolution

Differential evolution produces new children are produced due to crossover and/or mutation. Afterwards the fittness of this possible new population member is calculated. A metametical fu