



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
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COS 710: Artificial Intelligence
Assignment 3: Evolutionary Algorithms
Due Date: 30 April 2018, 23:59

This assignment involves implementing and evaluating a genetic algorithm to find solutions to the one-dimensional bin-packing problem described below:

The Offline One-Dimensional Bin-Packing Problem

The one-dimensional bin-packing problem involves allocating a set of items to bins so that all the items are packed using the minimum number of bins. The bins have a set capacity and usually all the bins have the same capacity. In the offline version of the problem the sizes of the items are known prior to packing while.

The Scholl benchmark set (<https://www2.wiwi.uni-jena.de/Entscheidung/binpp/index.htm>) must be used to test the genetic algorithm. The known optimum is specified as part of the benchmark for each of the problem instances.

The report must include:

- A description of the chromosomes.
- Define the fitness function used.
- Describe the genetic operators used.
- The genetic algorithm should be applied to two problem instances from Dataset 1 (easy problems), two problems from Dataset 2 (medium problems), and two problems from Dataset 3 (hard problems) from the Scholl benchmark set. List the problems that the genetic algorithm has been tested on.

- Perform a minimum of ten runs, each with a different random number generator seed, for each problem instance. List the best objective value, average objective value and deviation of the best objective value from the optimum over the ten runs for each problem instance. Using these results discuss the performance of the genetic algorithm in solving the chosen problem instances.
- Describe what method/mechanism can be used to describe the ruggedness of the fitness landscape. Using this method/mechanism describe the ruggedness of the fitness landscape for each problem instance.

Total:40