

Part A

generatePopulation - Creates the initial random population.

fitnessCalculation - Calculates the fitness for a given individual.

averageFitness - Finds the average fitness for a given population.

nFittestIndividuals - Finds the top n fittest individuals in a given population.

mutation - Performs a random standard mutation on a given individual.

Crossover - Performs a random one-point crossover using two parents.

plotGenerations - Plots the graph of average fitness against the generations.

GA - Genetic algorithm

- Create the initial population.
- Calculate the average fitness of the population.
- Store the average fitness.
- While the desired number of generations has not been met
 - o Perform a specified number of crossovers and add them to a new population.
 - o Use Elitism to carry over the fittest individuals from the previous generation.
 - o Perform mutations on the new population.
 - o If the algorithm has gotten stuck in a non-optimal population, increase diversity by increasing mutation rate and reintroducing individuals from original population.
- End While loop.
- Return data.

Part B

solutionValidator - Checks if a given individual is a valid solution, i.e. No bins are overfilled.

getMinNumberOfBins - Finds the minimum number of bins out of the whole population.

Mutation and Crossover - Work similarly as to Part A, only the mutation and crossover results are checked with the solutionValidator function.

GA - Genetic algorithm

- Create the initial population using *generatePopulation* function.
- Calculate the average fitness of the population using *averageFitness*.
- Store the average fitness.
- While the minimum number of bins has not changed for a set number of generations.
 - o Perform a specified number of crossovers and add them to a new population.
 - o Use Elitism to carry over the fittest individuals from the previous generation.
 - o Perform mutations on the new population.
 - o If the algorithm has gotten stuck in a non-optimal population, increase diversity by increasing mutation rate and reintroducing individuals from original population.
- End While loop.
- Return data.

