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Algorithm A: Genetic Algorithm

Algorithm B: Particle Swarm Optimisation

Description of enhancement of Algorithm A:

*You can vary the sizes of these boxes but not the font (Calabri), font size (11) or paragraph properties (single space)You may include a commentary on the general success of your enhancements if you wish.*

The most significant change that I made to my algorithm was the use of a function called newTourNN that generates Nearest Neighbour tours to use in the initial population. I experimented with using Minimum Spanning Trees but found this was ineffective.

My enhanced algorithm uses a different mutation function (mutateChild) which reverses a section of the tour instead of making a random swap.

I changed the way my tours were stored in order to keep a record of the length of the tour and the ordering of the cities, this meant that I could rewrite the function for choosing parents and introduce elitism. My enhanced algorithm uses the ‘fittest’ tours from the old population as a starting point for the new population.

To avoid local minima I also increase the probability of mutation each time a new shortest tour is found.

Description of enhancement of Algorithm B:

For my enhanced version of the Particle Swarm Optimisation (PSO) I used the nearest neighbour tours as initial positions for the particles. To avoid my particles starting at positions which are too similar I use a percentage of nearest neighbour tours and the rest are randomly generated.

The enhanced version uses a different discretization. This doesn’t require tours be put in canonical form, and uses a new function for finding the velocity between the positions of two particles. Instead of using bubble sort it iterates through the first tour and records the swaps required to reorder it according to the linear order defined by the second tour. This method of ‘sorting’ takes advantage of the knowledge that a tour contains one example of every city.

My enhanced version also has a new function for incorporating the epsilon value. This adds a random swap instead or removing one as it did in the basic version. This helps to keep the particles moving to avoid local minima.

I also experimented with a new way of calculating the velocity but found that this was less effective than the basic one.