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Algorithm A: Water-Flow Algorithm

Algorithm B: Ant Colony Optimisation

Description of enhancement of Algorithm A:

Water-flow uses 2-opt to alter the local solution of a flow to optimise it. For my enhancement I have decided to replace the 2-opt algorithm with the Lin-Kernighan heuristic. It is significantly more complicated, but it provides better solutions because the heuristic is better at optimising than 2-opt. I also varied the parameters but ultimately the best results were obtained by those recommended in the paper (referenced within the code) so I have focussed on describing the Lin-Kernighan enhancement here.

When using the enhanced version, I was able to obtain better tours for the city sets 42, 48, 58, 175 and 180 with the same parameters for the water-flow algorithm. For city sets 12, 17, 21 and 26 following extensive applications of all my implemented algorithms I believe the optimal solutions were found already by the original water-flow implementation (and matched by the enhanced version). For the 535-city set the algorithm is quite slow, as such it was not able to improve the solution (only match what my original implementation had managed). There are a few possible reasons for this, but I think the main improvement that could come from it would be to direct the search further as there are a huge amount more possible solutions to check for this set!

Overall, the enhancement was successful at finding improved tours for the majority of the city sets – even when the original waterflow and Lin-Kernighan on their own would stall.

Description of enhancement of Algorithm B:

*Type here.*