

**There is No Such Thing as the Colony? Thatcherism
in Heuristic Search: A Big Data Investigation**

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Abstract

This dissertation investigates the Ant Colony System method for solving traveling salesman problems. In particular it looks at a modification that introduces competition between the ants rather than cooperation in the standard method, and to what extent does local search drive the extended algorithm?

It does this by making the pheromone used to signal between ants repulsive rather than attractive, and the quality and nature of the solutions produced is investigated. In order to calibrate results, solutions are compared against other heuristic search methods.

The solutions were generated in Python. As some of the algorithms take considerable time, and a number of algorithms and problem sets were considered, computations were carried out on a Condor pool in parallel. In order to store the data produced, a MongoDB database was used which removed much of the administrative overhead required in the management of the results. This database could then provide multi-user and remote access to the data and allowed an interactive dashboard to be set up using Shiny in R.

Interesting results gave answers to the motivating questions and spawned new ones. The answers, both complex and nuanced, were somewhat surprising. The framework developed for generating results was a success despite a number of challenges encountered along the way.