

Something about the Vehicle Routing Problem

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ABSTRACT

This paper discusses new approaches to solving the rich vehicle routing problem, which is essentially the field of slight modifications to the vehicle routing problem (VRP).

1. DISCUSSION OF SOURCES

I will focus on applications of AI and evolutionary computation methods to solve the VRP, and mention other interesting methods such as human-assisted routing.

1.1 Sources I expect to use (and how)

- The core papers I expect to cite are a 1959 paper by Danzig et al. [?] and a 2014 paper written by Caceres-Cruz et al [?]. The first paper is the original formulation of the problem, which originated in a management science journal. Caceres-Cruz, the second paper, is a recent and extensive summary of the rich vehicle routing problem which is the category of problems that are created by slight alterations to the VRP. Both of these sources provide background about the problem and summarize approaches to solving the VRP.
- One of the most common VRP variants is the Vehicle Routing Problem with Time Window (VRPTW). The VRPTW deals with the problem of serving a set of customers with given service time windows using a finite fleet of vehicles. I chose two papers that both use novel agent-based systems to build approximate solutions. Hackel 2009 [?] uses an genetic algorithm inspired by bee colonies to solve the problem. The other paper, Leong 2006 [?], describes a two-step agent based system that conducts an initial tour and then uses the information gathered to avoid cases where naive agents can degrade the performance of the whole.
- I chose the rest of the papers to cover more obscure (and arguably interesting) topics within the rich VRP. A dynamic VRP is described in deOliveira [?], where

new nodes can be added or removed during service day. Vasirani 2008 [?] decentralized demonstrates a decentralized system of autonomous agents with well-defined utility functions can create fairly optimized routes. Finally Ben Ismail 2012 [?] explains a hybrid approach that uses humans to suggest heuristics in an interactive process.

1.2 Sources I doubt I'll use

- Well, as intriguingly titled as "Approximation Algorithms for Regret-bounded Vehicle Routing and Applications to Distance-constrained Vehicle Routing" [?] is, the regret bound is both poorly named and boring. Regret is apparently a measure of the waiting time of a client relative to its shortest-path distance from the depot, the thought being that clients who are near the depot wouldn't appreciate being last on the route. The paper itself is fine, but I simply can't bring myself to care about or deeply explain their methods. VRP has no shortage of good papers, and I am not desperate for sources.

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