

SOLVING SALESPERSON PROBLEM WITH
ARTIFICIAL INTELLIGENCE TECHNIQUES

BY

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ABSTRACT AND PREFACE

Operations research (OR) problems have been solved by the well-known mathematical algorithms and the conventional programming languages such as FORTRAN, PASCAL, ...etc.

This memo. is concerned with solving some OR problems (specially the network problems) by using the artificial intelligence (AI) techniques such as expert systems (ESs) and the declarative programming languages such as PROLOG* language.

The salesperson problem was taken as a classic network optimization problem to be solved with such AI techniques. A small ES was built for solving this problem. PROLOG language has been used as an ES tool since it is considered as an effective AI language. With minor modification to the suggested ES, the shortest route problem, the maximal flow problem, finding the spanning tree of a graph,...etc can be easily solved.

* PROLOG is a non-conventional programming language centered around a small set of basic mechanisms, including pattern matching, tree-based data structuring, and automatic backtracking. This small set constitutes a surprisingly powerful and flexible programming framework. PROLOG is especially well suited for problems that involve objects, in particular, structured objects and relations between them. For more details, refer to reference no. [1].

Chapter 1 introduces the traveling salesperson problem from operational research point of view. It also includes the FORTRAN program (stated in appendix) as a conventional approach to solve this problem.

Chapter 2 (the main chapter of this memo.) manipulates the same problem from artificial intelligence point of view. It introduces the the ES for solving the problem. It also introduces a small expert system for solving the salesperson problem using TURBO PROLOG language. This chapter also refers to the solution of the salesperson problem by artificial neural systems since researchers (in laboratories) showed that using artificial neural systems (ANS) enabled them to solve one salesperson problem on an ordinary micro-computer in 0.1 second compared to the optimal solution that required one hour of CPU time on a mainframe-computer using the conventional programming language [8].

Conclusion has been presented at the end of this memo.