Chapter I
Hybrid Artificial Intelligence Heuristics and Clustering Algorithm for Combinatorial Asymmetric Traveling Salesman Problem

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ABSTRACT

Problems of combinatorial optimization are characterized by their well-structured problem definition as well as by their huge number of action alternatives in practical application areas of reasonable size. Especially in areas like routing, task allocation, or scheduling, such kinds of problems often occur. Artificial Intelligence Heuristics, otherwise called Meta-heuristic techniques that mimic natural processes, can produce 'good' results in reasonable short runs for this class of optimization problems. Even though those bionic heuristics are much more flexible regarding modifications in the problem description when being compared to classical problem specific heuristics, they are often superior in their results. Those bionic heuristics have been developed following the principles of natural processes. In that sense, Ge-

netic Algorithms (GAs) try to imitate the biological evolution of a species in order to achieve an almost optimal state whereas Simulated Annealing (SA) was initially inspired by the laws of thermodynamics in order to cool down a certain matter to its lowest energetic state. This paper develops a set of meta-heuristics (GA, SA and Hybrid GA-SA) to solve a variant of combinatorial optimization problem called Asymmetric Traveling Salesman Problem. The set of met heuristics is compared with clustering based heuristic and the results are encouraging.

1. INTRODUCTION

Supply chain management (SCM) is now at the center stage of manufacturing and service organizations. Supply Chain is the network of suppliers, manufacturing, assembly, distribution and logistics facilities that perform the function of procurement of materials, transformation of these materials into intermediate and finished products and distribution of these finished products to the customers. The task of managing the entire supply chain constitutes the core of the supply chain Management.

1.2. Distribution Logistics Management

Logistics is that part of the supply chain process that plans, implements and controls the efficient, effective flow and storage of goods, services and related information from the point of origin to the point of consumption in order to meet consumer's requirements.

A major component of supply-chain system is Distribution, which involves delivery of goods and services to the customers. Efficient distribution of goods and services is of great importance in

Figure 1.1.Supply chain structure