



Improvement of Scatter Search Using Bees Algorithm

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Abstract— The Scatter Search is one of the population-based metaheuristics, which can be used to solve a wide range of problems including Traveling Salesman Problem (TSP), Routing Protocol, and End-to-End QoS, while Bees Algorithm can be applied to optimize the solution of these problems. In this paper, an improved Scatter Search algorithm based on Bees Algorithm has been presented. The improvement provides Scatter Search with random exploration for search space of problem and more of intensification for promising solutions. The original and improved Scatter Search has been tested on Traveling Salesman Problem. A computational experiment with benchmark instances is reported. The results demonstrate that the improved Scatter Search algorithm produces better performance than original Scatter Search algorithm. The developed algorithm has been compared with other algorithms for the same problem, and the result was competitive with some algorithm and insufficient with another.

Keywords— component; Metaheuristic; Scatter Search; Bees Algorithm; Combinatorial Problems; Traveling Salesman Problem

I. INTRODUCTION

presented development for multiple object visual trackers based on the Scatter Search Particle Filter (SSPF) algorithm. It has been effectively applied to real-time hands and face tracking. Jose A. *et al* [6] presented the SSKm algorithm proposed methodology for global optimization of computationally expensive problems. Saber *et al* [7] presented hybrid genetic Scatter Search algorithm that replaced two steps in Scatter Search (combination and improvement) with two steps in genetic (crossover and mutation). This algorithm leads to increase the efficiency and exploration of the solution process. T. Sari *et al* [8] evaluate Scatter Search and genetic algorithm. Resource constrained project scheduling problem which is an NP-hard problem is solved with two algorithms. They conclude that genetic algorithm outperformed Scatter Search. Tao Zhang *et al* [9] presented development of new Scatter Search approach for the stochastic travel-time vehicle routing problem with simultaneous pick-ups and deliveries by incorporating a new chance-constrained programming method. A generic genetic algorithm approach is also developed and used as a reference for performance comparison. The evaluation shows the performance characteristics and computational results of the

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