Comparative evaluation of Tabu search hyper-heuristic against its low-level meta-heuristic constituents

Fakhrud Din [1,2] and Kamal Z Zamli [1]

1 Faculty of Computer Systems & Software Engineering, University Malaysia Pahang, Kuantan, Malaysia
2 Department of Computer Science & IT, University ofMalakand, KPK, Pakistan
kamalz@ump.edu.my

Abstract:
Hyper-heuristics present a superior form of hybridization of meta-heuristics. Unlike typical meta-heuristic hybridization, which requires low-level integration of two or more metaheuristics, hyper-heuristics offer meta level separation (as domain barrier) of each participating low-level meta-heuristic and permit adaptive selection between them. Owing to the prospects of improving the generality of its application to general optimization problems, this paper evaluates the performance of a Tabu search based hyper-heuristic (called HHH) against its individual low-level meta-heuristic (LLH) constituents. The results based on its application to t-way test suite generation problem indicate that HHH outperforms all its individual LLH constituents consisting of particle swarm optimization (PSO), global neighbourhood algorithm (GNA), cuckoo search (CS) algorithm and teaching learning-based opthnization algorithm (TLBO). However, there is a time performance penalty as overhead to perform the nmtime adaptive selection of each LLH.

Keywords: . Hyper-Heuristic; Tabu; Meta-Heuristic

ACKNOWLEDGMENT

This work is partially funded by the FRGS Grant from the Ministry of Higher Education Malaysia titled: A Reinforcement Learning Sine Cosine based Strategy for Combinatorial Test Suite Generation (grant no: RDU170103) and the UMP h1ternal Grants titled: Optimization using Artificial Bee Colony Algorithm (grant no: RDU182301).