Tribhuvan University
Institute of Science and Technology

Metaheuristic Solutions to the Response Time Variability Problem

Dissertation

Submitted to:

Central Department of Computer Science and Information Technology
Kirtipur, Kathmandu, Nepal

In partial fulfillment of the requirements for the Master's Degree in Computer Science and Information Technology

by

Rajendra Prasad Joshi
CDCSIT, TU
2013, Feb

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Supervisor

Assoc. Prof. Dr. Tanka Nath Dhamala

Tribhuvan University

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Student's Declaration

I hereby declare that I am the only author of this work and that no sources other than the listed here have been used in this work.

Rajendra Prasad Joshi

Date: … … … …

Supervisor's Recommendation

I hereby recommend that this dissertation prepared under my supervision by **Rajendra Prasad Joshi** entitled "Metaheuristic Solutions to the Response Time Variability Problem" in partial fulfillment of the requirements for the degree of M. Sc. in Computer Science and Information Technology be processed for the evaluation.

… … … … … … … … … …

Assoc. Prof. Dr. Tanka Nath Dhamala

Date: … … …. … … …

Tribhuvan University

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Central Department of Computer Science and Information Technology

LETTER OF APPROVAL

We certify that we have read this dissertation and in our opinion it is satisfactory in the scope and quality as a dissertation in the partial fulfillment for the requirement of Masters Degree in Computer Science and Information Technology.

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Acknowledgement

It is a great pleasure for me to acknowledge contribution of a large number of individuals to this work. First of all, I would to thank my supervisor Assoc. Prof. Dr. Tanka Nath Dhamala for giving me an opportunity to work under his supervision and providing guidance and support throughout this work. His co-operation, suggestions, constructive comments and the investment of time for discussion in this study are appreciable. His vigorous efforts made me present this dissertation work in this form.

I would like to thank respected teachers Prof. Dr. Sashidhar Ram Joshi, Prof. Dr. Subarna Shakya, Mr. Min Bahadur Khati, Mr. Jagdish Bhatt, Mr. Dhiraj Kedar Pandey, Mr. Arjun Singh Saud, Mr. Nawa Raj Paudel, Ms. Lalita Staphit, Mr. Sarbin Sayami, Mr. Bishnu Gautam, Mr. Tej Bahadur Shahi for their invaluable suggestions and help.

Finally, I would like to specially thank my friend **Shiv Raj Pant** for his encouragement and support in each and challenging condition of this dissertation. Last I would like to thanks all my friends, colleagues and all my well wishers who directly and indirectly helped me during this work.

Abstract

The problem of variation in the response time is known as response time variability problem (RTVP). RTVP is a combinatorial NP-hard problem which has a broad range of real-life applications: mixed-model assembly line in production systems, multi-threaded computer systems, network environments, broadcast of commercial video tapes, salesman's routes, and machine maintenance, among others. The RTVP arises whenever events, jobs, clients or products need to be sequenced so as to minimize the variability of the time they wait for their next turn in obtaining the resources they need to advance. The concept of variation in response time has been recently appeared in literature and a lot of research is being carried out in this areas.

This dissertation includes recent researches regarding the response time variability problem. Our concern in this dissertation is to find out near optimal sequence of jobs with objective of minimizing the response time variability. Several solutions based on heuristics and metaheuristics exist in the literature to fulfill this objective. This dissertation work focuses on the metaheuristic solutions to the RTVP. The metaheuristic procedure to solve the RTVP is put forward by applying the following three procedures: Multi-Start (MS), Greedy Randomized Adaptive Search Procedure (GRASP) and practical swarm optimization (PSO). This dissertation work mainly focused on multi-start and GRASP. In this dissertation, we implement and analyze the experimental result of the metaheuristic algorithms.

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List of Abbreviations

GRASP: Greedy Randomized Adaptive Search Procedure

JIT: Just-In-Time

MILP: Mixed integer linear programming

MS: Multi-Start

PSO: Particle Swarm Optimization

RTV: Response Time Variability

RTVP: Response Time Variability Problem

SA: Simulated Annealing