Tribhuvan University

Institute of Science and Technology

MINIMIZING THE EVACUATION TIME OF TRAFFIC MANAGEMENT SYSTEM USING SIMULATED ANNEALING ALGORITHM

Dissertation

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Master of Science in Computer Science and Information Technology

By

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Supervisor

Assoc. Prof. Dr. Tanka Nath Dhamala

Date:………………..

Recommendation

We hereby recommend that the dissertation prepared under my supervision by Mr. Bal Krishna Subedi entitled "**Minimizing the Evacuation Time of Traffic Management System Using Simulated Annealing Algorithm**" be accepted as fulfilling in part requirements for the degree of Master of Science in Computer Science and Information Technology. In my best knowledge this is an original work in computer science.

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

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ABSTRACT

Route configuration is important task for evacuation planning of any disaster. Evacuation route planning problem is to find optimal route through obstacle's environmental graph from a specified start location to a desired goal destination while satisfying certain optimization criteria. Emergency Evacuation Route Planning [EERP] problem should be optimal for the best path configuration. Recently, a genetic algorithm based approach has been introduced to configure the optimal route for EERP problem. However, it has not done with increase of city or place, changing direction of source, goal and congestion place, and handling of heuristic information. Consequently, the performance of the genetic algorithm based approach deteriorates significantly. This motivates the research of the tasks.

The simulated annealing algorithm based approach to find the optimal route for emergency evacuation route planning is an optimization algorithm similar to the genetic algorithm in principle. However, our investigation and simulation have indicated that the simulated annealing algorithm based approach is simpler and appropriate for EERP problem. Its performance is also shown to be better than that of genetic algorithm based approach in EERP.

The first step of route configuration for EERP problem is to search an initial feasible route. A commonly used method for finding the initial route is to randomly pick up some vertices of the graph of cities or places. The tasks propose a heuristic method to search the feasible initial route efficiently and then, the heuristic method is incorporated into the proposed simulated annealing algorithm based approach, which takes less evacuation time to get optimal route configuration for EERP problem.

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LIST OF ABBREVIATIONS

TERMS   FULL FORM

SAA   : Simulated Annealing Algorithm

GIS   : Geographic Information System

EERP   : Emergency Evacuation Route Planning

TSP   : Traveling Salesman problem

FHFE   : Flip High Flow Edge

MARS   : Model based Annealing Random Search

SMC-SA   : Sequential Monte Carlo Simulated
                                                   Annealing

CCRP   : Capacity Constrained Routing Planner

LP   : Linear Programming