

Application of Fuzzy Hamiltonian Graphs for Optimal Route Search in City Transportation

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ABSTRACT

The concept of Fuzzy Hamiltonian graphs in determining optimal routes in city transport network is applied. Traditional graph theory methods have struggled to effectively address imprecise parameters such as fluctuating traffic densities, varying road quality, inconsistent transport costs, and uncertain interconnections between nodes. In the proposed work, the ideas of fuzzy set theory and graph structure are employed to represent transportation network models more accurately. In the suggested framework, cities or junctions are modelled using vertices, while the roads are considered fuzzy edges. The membership values associated with each edge denote accessibility, safety, or transport efficiency levels. The algorithm designed here determines the fuzzy Hamiltonian cycle for finding the best route connecting all important vertices of a graph with minimum uncertainty and transportation cost. The findings show that fuzzy Hamiltonian graphs form a highly versatile mathematical framework for developing efficient route planners. Also, intended for the further expanding the application of FTSP beyond Indian cities to major cities worldwide can enhance route planning.

KEYWORDS: Fuzzy Graphs, Hamiltonian Cycle, Travelling Salesman Problem, Optimal route.