An Intelligent Road Traffic Management System Based on a Dynamic Routing Technique and Human Community Genetic Algorithm (IRTMS)

By

Mohammad Abdul Mohdi Abdul Jawad

Supervision

Dr. Adnan Ahmad Hnaif

Co-Supervision

Dr. Nagham Azmi Al-Madi

Abstract

The smart cities concept began in the 1990's. Since, technologies transportation and communication rises. Traffic congestions were recognized as major problem in the modern urban cities.

In this study, we develop an intelligent Road Traffic Management System Based on a Dynamic Routing Technique and Human Community Genetic Algorithm (IRTMS). The proposed model depends on the human community-based genetic algorithm (HCBGA) model and on the Enhanced Interior Gateway Routing Protocol (EIGRP), IRTMS makes the traffic signal more efficient by reduces the waiting time at the traffic intersections, and facilitate the commutations among the traffic signals. These main objectives generate other objectives like reducing the fuel consumption and CO2 emissions form the idling vehicles in the traffic signals, and reducing the congestion cost.

It is found that, Jordan is considered as one of the top countries worldwide in terms of frequency of traffic accidents where the increase in the number of vehicles had led to the increase in the number of traffic incidents, involving the increase in fatalities and injuries, but the current traffic signals system in Jordan is still controlled by the fixed timers. Therefore, the IRTMS is compared with the current traffic system in the Hashmet Kingdom of Jordan.

This study is comprehensive to many scenarios: four of these scenarios are listed in this study and implemented by the system using MATLAB; based on specific rules. According to these sufficient testing scenarios, the IRTMS is more effective than the current traffic system.

According to the IRTMS system accomplished sufficient results: that compared with the current traffic system, experimental results prove the IRTMS system effectively, where the enhancement in the total time and the waiting time percentage; approximately 95%, for all listed scenarios. That means the IRTMS system decreases the total time and the waiting time, which caused to easily solve the traffic congestion problem.

It is concluded that, the proposed system (IRTMS) in all scenarios, has the minimum total time and waiting time than the current traffic system. That leads, IRIMS is more efficient than the current used traffic system.