



Optimizing traffic lights by detecting congestion status

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Abstract

Since traffic lights are the only mechanized system at street level, their operation mode affects traffic congestion. There are many works on recognizing traffic congestion and ways of handling traffic to reduce congestion. Traffic light smartification is an algorithm to reduce vehicles general waiting time base on density of traffic flows. This algorithm changes static timing and predetermined timing of the traffic lights, so it can affect the density of traffic at the large scale. By this algorithm, if we consider each direction of streets as a directed weighted edge, vehicles on edges with lower weight may spend more time behind traffic lights, but general waiting time will be reduced. The proposed algorithm is simulated with the help of MATLAB software in order to demonstrate the superiority of this algorithm. As Result, algorithm could act better nearby 10 vehicle/sec to reduce in sparse situation and about 10 vehicle/sec to reduce traffic in dense situation at our imaginary topology in compare with static timing. So simulation results demonstrates performance improvement with the approach outlined.

Key words: Traffic Light Controlling, VANET, Graphs, Distributed Systems

1. Introduction

1.1. Traffic Light introduction

Since the cars are introduced as a public transportation vehicle, people widely used them for its comfortability and reducing travel time. After a while, over density of vehicles, which also known as traffic congestion, causes urban people spend most of their time in it. Traffic Congestion has many side effects like wasting time and fuels, air and sound pollution, mental and Respiratory diseases and economic loss, so researchers tried to work on methods to reduce traffic congestion.

Large scales cities consist of multi paths that crosses with each other by crossways and squares. The only way of managing crossways and pass ways is using traffic lights which controls input and output traffic flows. This system is controlled by some algorithms or by human. Traffic lights control drivers and pedestrian by sending light signal. If we don't consider manual methods, classic method is the most reliable and common way of time scheduling for traffic lights. The main problem of this approach is its inefficiency at abnormal situations because it cannot be adopted to new situations like car accidents or sudden change in weather condition. By changing the perspective and considering large scale, traffic lights are related to each other and they can affect each neighbors whether