

# OPTIMIZING TRAFFIC MANAGEMENT

## Abstract

In cities, the number of vehicles continuously increases faster than the available traffic infrastructure, congestion is a difficult issue to deal with and it becomes even worse in case of car accidents. This problem affects many aspects of the modern society, including economic development, traffic accidents, increase in greenhouse emissions, time spent, and health damages. Hence, modern societies can rely on traffic management system to minimize traffic congestion and its negative effects. Traffic management systems are composed of a set of application and management tools to improve the overall traffic efficiency and safety of the transportation systems. Furthermore, to overcome such issue, traffic management system gathers information from heterogeneous sources, exploits such information to identify hazards that may potentially degrade the traffic efficiency, and then provides services to control them.

## Alternative route guidance

Suggesting and computing alternative routes to avoid traffic hazards are the better ways to improve the overall traffic efficiency. The main challenge is how to do this in an acceptable time by reducing an undesired overhead, consequently avoiding the vehicles stuck in some congestion. Although relying on central entities (centralized approach) to compute and suggest alternative routes to all vehicles is more efficient due to its better management, depending on the number of vehicles to be re-routed and the complexity of the algorithm used in the alternative route computation may introduce high overhead, degrading its performance. With this problem in mind, one solution is to enable each vehicle to compute its own alternative route. However, the key challenge is how to provide a full scenario overview about the traffic condition to every vehicle to enable them to compute an efficient route without overloading the network. Another concern is how to compute an efficient alternative route without incurring in traffic congestion in other areas in the nearby future, providing a better traffic balance and management. To have a good alternative route guidance, a trade-off between efficiency and complexity is essential.