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DETECTION AND AVOIDANCE OF ROAD TRAFFIC CONGESTION USING VANET

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Abstract

The advances in wireless technologies, mobile vehicular networks are likely to become the most relevant form of mobile ad hoc networks (MANET). Vehicular communication which facilitates the exchange of information between vehicles is the prerequisite not only for extending the access to Internet while on the road, but also to cater for special applications such as of road traffic and travel management. However despite the increasing studies on vehicular routing protocols, the support to applications other than the access the internet remains limited.

INTRODUCTION

Vehicular Ad-hoc Networks (VANET) [1] are wireless networks which facilitate information exchange between mobile vehicles with no permanent network infrastructure required. VANETs become a cornerstone of the envisioned Intelligent Transportation Systems (ITS) [2]. There is an increasing interest in developing efficient vehicular ad hoc routing protocols to expand Internet to vehicles on the road, thereby allowing point-to-point communication between vehicles as well as access to services available on the Internet In this paper we propose a novel vehicular communication system for detecting traffic jam through information gathered using inter-vehicles communication. This information is processed by the vehicles on-the-fly, allowing them to determine the congestion spots in urban areas, and thereby computing alternative and less congested itineraries. In our approach, vehicles play the role of mobile censors which continuously record road congestion information by monitoring their own speed and travel time. This information is processed by the vehicles on-the-fly, allowing them to determine the congestion spots in urban areas, and thereby computing alternative and less congested itineraries. In our approach, vehicles play the role of mobile censors which continuously record road congestion information by monitoring their own speed and travel times. This information is disseminated among vehicles using a simple geocast protocol. While providing infotainment and added-value services on the move. To achieve their objectives, cooperative vehicular systems will be based on wireless communications between vehicles and with other infrastructure nodes, and will have to deal with highly dynamic nodes

2. NEED TO AVOID ROAD TRAFFIC CONGESTION

Foreseen cooperative systems for intelligent transportationsy stems (ITS) address the current and future needs of increasing traffic safety, efficiency and comfort. Despite the predicted growth rates in the number of motorized vehicles and the volume of transported goods, transportation should become safer, cleaner, more efficient and more comfortable. Variable Network density: The network's density depends on vehicular density which is highly variable. In traffic jam situations the network can be categorized in very dense networks which in suburban traffics it could be a sparse network. The topology of the network could be affected by driver's behavior due to his/her reaction to the messages. In other words the content of messages can change

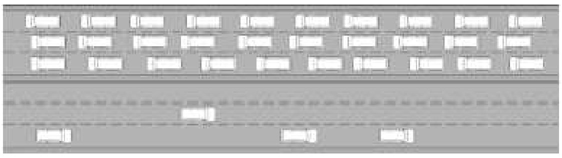

Fig. 1. Highway scenario with a traffic jam in one direction of driving and free flow conditions in the other direction. This example represents a typical traffic situation in which congestion control and awareness control protocols might be needed.

2. VEHICULAR AD- HOC NETWORKS (VANETs)

VANET is a class of Mobile Ad-Hoc Networks. Vanet provide communication between vehicle to vehicle between vehicle and road side in fracture. The base station gathers the information from all the vehicle's from where all the vehicle are provided in order to avoid any congestion .Vanet provide safety and High Dynamic Topology , Routing Security, and quality of service.(QoS).

LESS CONGESTED ITINERARY ALGORITHM

The proposed congestion avoidance algorithm aims at finding the less congested path to a given destination. In this paper we considered using a dynamic variant Which the node is currently in, and which might be used proactively by the controller as feed forward input. The controller itself decides how the transmission will be adjusted, of course depending on the situation and the corresponding target description, i.e. the current objective. The selected action then leads to an observable result, which can be fed back to the controller in order to improve its accuracy of the classical Dijkstra algorithm for finding the shortest path between a points to a given destination. In principle one could have used simply classic Dijkstra by replacing the distance matrix with a congestion index matrix and the algorithm still works since the objective is to find a path with the least distance. However,. First, unlike distances which are static parameters for Dijkstra algorithm, congestion indexes are dynamic. Indeed, traffic congestion condition changes continuously. Therefore while, a vehicle is driving towards its destination, the less congested itinerary may change dynamically, which requires vehicles to regularly re-calculate their itinerary. Second, a least congested itinerary may not be necessary the best one in terms of traveled distance and cost. Therefore, we designed a factor-based formula which encompasses both the metric distance d and the congestion idea.

3.2 HYBRID APPROAC CONGESTED APPROACH

The relationship of congestion and awareness control to traditional control theory,[8] this paper discusses existing proposals for congestion and awareness control with respect to the concepts and notions typically used in control theory. For this purpose, both methods are analyzed and compared according to the general framework sketched in Fig. 2: an algorithm might use some sort of detection to classify the traffic situation or scenario.

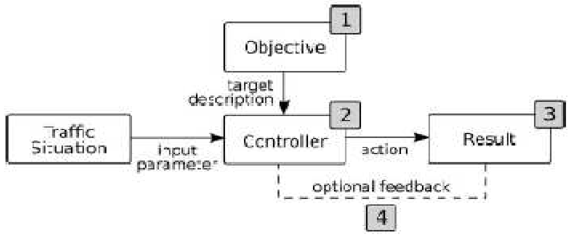

Fig 2 Analysis of congestion and awareness control algorithms

Which the node is currently in, and which might be used proactively by the controller as feed forward input. The controller itself decides how the transmission will be adjusted, of course depending on the situation and the corresponding target description, i.e. the current objective. The selected action then leads to an observable result, which can be fed back to the controller in order to improve its accuracy

3.2 D-FPAV approach Congestion control

The D-FPAV approach is aimed at limiting the amount of traffic that is generated by vehicles, with the goal of keeping this load under a specified congestion limit by tuning the congestion limit, the optimal point of the Binter ference level versus Breception rate trade off can be found. The optimal tuning of this tradeoff is however out of D-FPAV scope. The D-FPAV protocol is periodically executed on the nodes forming the vehicular network, in order to adjust node transmission power in response to changes in the network topology or application-layer traffic patterns.

3.3 Geo-Opportunistic Approach:

To reduce the channel load while satisfying the application requirements, OPRAM is designed to dynamically increase the transmission power and packet rate of each vehicle only in a small region before CD, called the Algorithm Region as illustrated in . With this geo-opportunistic increase, OPRAM aims to guarantee with high probability the correct reception

of at least one packet from a potentially colliding vehicle before reaching CD, while minimizing the overall channel load. Outside AR, OPRAM operates with a low transmission power, sufficient to communicate with the vehicles moving along the same street in line-of-sight propagation conditions.

3.4 FAIR CONGESTION CONTROL

1 *Congestion control*. Limit the load on the medium produced by periodic beacon exchange possible.

2 Fairness. Maximize the minimum transmit power value over all transmission power levels assigned to nodes that form the vehicular network under Constraint.

3*Prioritization*. Give event-driven emergency messages higher priority compared to the priority of periodic beacons.

The congestion control requirement Constraint is applied only to beacon messages, which is coherent with our design goal of controlling the channel bandwidth assigned to periodic safety-related messages.

3.5 TRAFFIC ROUTING ALGORITHM DESIGN

Traffic advisory or vehicular navigation systems, an increasingly standard feature of most vehicles, rely on positioning information and map databases to provide step-by-step navigation information to the driver. Search algorithm for finding the lowest cost path to a destination given the available segment cost data.

4 PROPOSED WORK

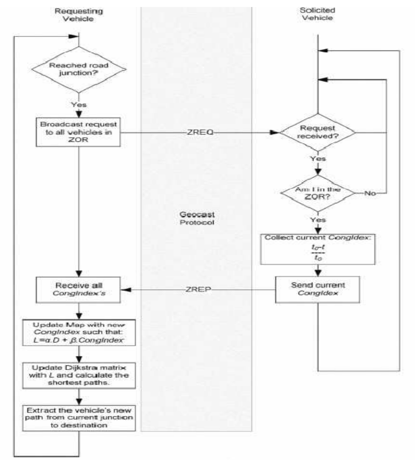

Fig 3 less congested itinenry algorithm[1]

we describe the approach we took for the detection and the avoidance of road traffic jam. The method consists of integrating both the less-congested itinemry algorithm and the SOP in the solution illustrated fig 3. When a vehicle approaches a given junction, it uses the geocast protocol to broadcast a request for traffic. Congestion within a given area indicated by a ZOR. All the vehicles in that ZOR respond indicating the traffic congestion level each in its corresponding location. The vehicle receives from these vehicles the congestion index within the ZOR. The vehicle updates its internal matrix with the congestion indexes it received and preserves the congestion index of the road section that it has not received any update for. Furthermore, since more than one vehicle may send its own congestion index for the same road section, the vehicle aggregates this information by using any variant of averaging techniques . For our work, we have used simple average of all the congestion indexes received for the same road section, since the obtained results did not show noticeable differences. After the matrix has been updated, it is fed as input to the least-congested itinerary algorithm which is executed and may result in a newer itinerary which is the least congested based on the pre-configured D and D factors.

CONCLUSION

In this paper we have presented a novel and integrated solution for detecting and avoiding road traffic congestion using solely the information gathered and exchanged between vehicles on the road. The objective of this paper is to show that ad hoc vehicular communication can be of great use in developing useful applications such as those for road traffic and travel management. developing useful applications such as those for road traffic and travel management.

ALGORITHM	DESCRIPTION	ADVANTAGE	DISADVANTAGE
Least Congestion itinery algorithm	The proposed congestion algorithm to find the least congested path	Fast in operation find out least congested path	Depend on ZOR in rectangle shape
Hybrid approach	Communication between vtov desition to adust the transmission paramaters	Give ability to prevent congestion in the proactive environment.	1Load generated by the neighbor vehicles such approach require communication nmodel that's maps
O-PRAM	Based on max-min principle of transmission power	Accurately estimate the node density	Become slow when power on the node increases
Fair Congestion control	Congestion control requirement is applied to beacon messages	Works at the larger width of communication range	Performance decereaces when node density increases.

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