Highway Traffic Management System: Recent Trends and Future Challenges

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Abstract. Highway Traffic Management System (HTMS) is one of the important functional Systems of Intelligent Transportation Systems(ITS), which deals with data collection from roadside equipments, in order to provide more efficient services to highway users and to swiftly react in case of hazardous situations. More specifically, HTMS plays a vital role in road transportation systems, due to these reasons: a) High service capability in terms of both volume and speed, b) Exhibit limited controllability feature because of the nature of vehicular traffic, c) Recent technology developments enable new applications with the use of heterogeneous traffic data. This article provides a comprehensive summary of HTMS by providing a brief outline of existing literature and recent trends followed by the highlights of future research directions of this domain.

Keywords: Intelligent Transport System, Highway Traffic Management System, Traffic State Estimation

1 Introduction

According to *Global Status Report on Road Safety-2013* by Ministry of Road Transport & Highway of India [1], one death occurs for every 4 minutes due to road accidents in India and 16 children die on Indian roads daily. Further, the latest report *Road Accidents in India-2015*, by Transport Research Wing of Ministry of Road Transport & Highways of India [2] indicates that, about 1374 accidents and 400 deaths take place every day on Indian roads which further translates into 57 accidents and loss of 17 lives on an average every hour in our country. In order to put an end to the road accidents, recently Intelligent Transportation Systems(ITS) concept is introduced, which emphasizes on the application of electronics, communication technologies and management strategies in an integrated manner to enhance the safety as well as efficiency of the

* Please note that the LNCS Editorial assumes that all authors have used the western naming convention, with given names preceding surnames. This determines the structure of the names in the running heads and the author index.

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Query-Based Retrieval of Annotated Document

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Abstract - *An Annotation is a Meta information connected to a record or other information. It makes references to a particular part of the document and information quality is the level of information quality retrieved. It is imperative as client needs exact and auspicious data. As information quality is the real issue in current databases this application concentrates on enhancing the information quality. Extensive information is produced in various associations which are in printed form. In such information, organized data gets shadowed in unstructured data. Numerous calculations takes a shot at extraction of data from crude information, however which is exorbitant and not proficient furthermore indicates polluted results. Information quality is likewise the fundamental issue.*

In existing framework utilized comment for question inquiry and work on property recommendation which makes questioning feasible however explanation that utilizes characteristic quality sets oblige clients to be more principled in their comment endeavors. Likewise client dependably has smart thought in utilizing and applying the comments.

In this project, a new procedure is proposed that consolidates the working of (Collaborative Adaptive Data Sharing stage) CADS and USHER for characteristic recommendation and enhancing information quality. In the methodology used here first CADS structure is produced and after that an access to certifiable information sets segments is made through USHER technique. This procedure demonstrates better results looked at than current methodology. It enhances the perceivability of archive furthermore information quality with least cost.

Using this application user can search and retrieve document in a fast and efficient way. Here user uses query based technique to search the document. Using this technique user can easily search for the document. The idea of this project is to direct use of the query workload to direct annotation process. It also reduces the time taken to search the document based on previous search priority.

1. INTRODUCTION

Associations produce expansive measure of unstructured information. Propelled development in information gathering and capacity innovation made it conceivable to mastermind this information at lower expense. The objective of the application is Exploiting this information, with a specific end goal to separate valuable and significant data. To get compressed pursuit data is our prerequisite and to get this we orchestrate information in savvy way. Explanation is one of the best procedures to organize and get powerful query item.

For the most part combines of Attribute – value are more important and noteworthy as they can contain more data than un typed approaches yet required client are more principled in their endeavor.

Miscreants proposed information sharing stage for the group. Initially CADS take in the data interest and afterward it gives property at insertion and questioning time and utilized this data for formation of versatile structure. In this we specifically utilized question workload to direct explanation. The main objective is to give explanation with ease. Explanation is utilized for giving future questioning. We utilized CADS as a part of proposed framework for structure outlining and giving trait name furthermore we recommend property estimations.

Nature of information is fundamental issue in tremendous accumulation of databases, while recovering this information there are heaps of issues. USHER proposed framework that enhances information quality powerfully. Utilizing inquiries of the structure USHER takes in a probabilistic model and after that for enhancing information quality applies this model on each progressions of the information section process. It will decreases questions asked by the client, and enhances execution of inquiry pursuit. For characteristic and worth distinguishing proof from record CADS is utilized. For discovering conditions over the traits and minimizing number of made inquiries USHER is applied.

In this application joint methodology of CADS and USHER is proposed which is a versatile strategy for consequently creating inquiry shapes and on that probabilistic model for distinguishing mistakes and minimizing questions is applied. Collaborative Adaptive Data Sharing platform (CADS),give "comment on as-you make" handled information comment foundation. The framework supports utilizing the substance of the report to coordinate the explanation process with direct inquiry workload. Alongside this commitment does property estimation dynamically. Additionally in today's reality alongside effective extract information from the report is likewise vital.

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A Study of Message Authentication Protocol with Reduced Computation in Vehicular Ad-hoc Network

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Abstract - *The Vehicular ad-hoc network is an important component of Intelligent Transportation Systems, which has a future potential in terms of different application that it can provide. It presents a very complex cyber-physical system where vehicles need to frequently broadcast their geographic information. Efficient working of the complete system requires proper processing of large data traffic rate that may be caused due to safety message broadcasting in an area with a high density of vehicles. This paper aims at study and analysis of protocol for reducing computation caused by the safety message authentication. Main focus of the study is a cooperative message authentication protocol (CMAP) which enables sharing of verification results between vehicles in a cooperative way and thereby significantly reduces the number of safety messages that each vehicle needs to verify. This reduces vehicles' computation burden. The study also includes the verifier selection algorithms for detecting invalid messages at high rate. Further the study covers analytical model for CMAP and the existing probabilistic verification protocol [8], considering the hidden terminal impact*

Key Words: vehicular ad-hoc network, security, safety application, cooperative authentication, missed detection ratio.

1. INTRODUCTION

The intelligent transportation system (ITS) constitutes advanced communications technologies integrated into transportation infrastructure and vehicles. The vehicular ad-hoc networks (VANET) being at the heart of ITS, have found a wide range of applications such as safety and eliminating excessive cost of traffic collisions, providing information and entertainment services, extending reach of infrastructure networks, mobile advertising, security and privacy provisioning, and energy consumption control for hybrid electric vehicles (HEVs) [3], [7], [28] etc..

The VANET presents a very complex cyber-physical system (CPS) with intricate interplay between the physical domain and the cyber domain. On one side, the complicated physical domain of VANET incurs many challenging issues to the cyber domain. For example, different transportation infrastructures, e.g., those in urban and country areas, require different road side unit (RSU) deployment strategy for optimal VNS performance. Frequent broadcast of safety messages from vehicle along the road may leak the travelling route of a vehicle, which could be a privacy issues. On the other side, the design of control algorithms and networking protocols in the cyber domain significantly impact the performance in the physical domain. For example, the network congestion conditions determine whether certain safety messages could be timely delivered to other vehicles. The lack of a good security solution or a stimulation scheme will discourage vehicles to collaborate with each other for safety related or entertainment related applications.

This paper focuses on the security aspect of the vehicular cyber-physical system. Security and privacy are crucial for VANETs [3]. In a VANET safety application, each vehicle periodically broadcasts its geographic information (which can be obtained from a global positioning system (GPS) receiver) say, every 300 ms, including its current position, direction and velocity, as well as road information [2]. In order to provide secure functionality of authentication, integrity, and non-repudiation, every message sent by Vehicles needs to have a digital signature [4]. Verifying the signatures of the received messages will incur a significant computation overhead. Furthermore, vehicles have to change their signing keys periodically [2] or employ computational expensive techniques, such as short group signature [5], for the sake of privacy provisioning. Both methods will further increase vehicles' computation load for message verification. When the density of vehicles is high [6], [7], the computation overhead may become intolerable for the on board unit (OBU) installed on a vehicle. Cooperative message authentication is a promising technique to alleviate vehicles' computation overhead for message verification. In [8], vehicles verify messages in a cooperative manner, employing a probabilistic verification protocol (PVP). However, in order to guarantee cooperation efficiency, vehicles have to verify at least 25 messages within 300 ms, which is still a heavy computation burden. Our work in [7] studies how to properly select verifiers to further reduce the computation overhead in cooperative authentication, considering the hidden-terminal impact. However, both [7] and [8] focus only on one-dimensional (1-D) high way scenario.

In this paper, we present a cooperative message authentication protocol (CMAP) for a general two-dimensional (2-D) city road scenario with an assumption

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