MESSAGE MINING FOR EMERGENCY NEEDS THROUGH VANET

C.Manimaran, R.Mohan

***Abstract*—In VANET vehicular distribution individual vehicles distribution and performance at network level can be evaluated with various measures such as their mean journey time, their mobility in particular area and the other vehicle corresponding to similar vehicular motions etc. Rather than determining vast area modeling particular city and validation of data from that area predicts accurate metrics for calculating vehicular network performance and evaluation. Vehicular networks have been attracting increasing attention recently from both the industry and research communities. Most of the existing works mainly focus on designing. In our proposed model rather than microscopic models which finds vehicular distribution and performance we mine messages from vehicular area network. Every individual vehicle should collect and update its information time by time and furnish those messages to Dynamic database effectively. It can be used during emergency situations by mining required data from database.**

***Index Terms*—Vehicular networks, mobility modeling, model validation, message mining, emergency need.**

I. INTRODUCTION

In vehicular ad hoc networks (VANETs) finding solutions for traffic issues such as traffic jams and accidents thus enabling new mobile applications without serious trafficking. It becomes tough to maintain steady and fast connectivity communication networks [1]. Although the existing models concentrates only on various level of network performance such as vehicular distribution and performance. Moreover we did not get any feedbacks from vehicles for future use.

In microscopic and macroscopic levels overall vehicular behaviors and traffic is characterized according to its quantities and metrics of vehicular traffic such as vehicular distribution, density and mean velocity. In macroscopic model of vehicular mobility there are three metrics for evaluating vehicular mobility and system performance [2] [3] [4]. Those three metrics are vehicular area distribution average sojourn time in each area and average mobility length.

For vehicular networks there are two applications for analyzing system level performance and dimensioning. During increase of vehicles due to increase of communication from RSUs capacity determination is the first application [5] [6] [7]. Second application is to investigate performance of combined communication network of V2I and V2V.

In consequent vehicular communication protocols the vehicles mobility can be altered dynamically. Vehicular mobility modeling provides realistic vehicular mobility description [8]. Due to incomparable features of available models varies with vehicular traffic with degree of realism.

In existing model they focus only on various levels of network level performance such as vehicular distribution and vehicular performance [9]. It plots area and timestamp details of moving vehicles and assumes for their intersection key and models performance. In the previous models we don't get any feedbacks from vehicle transmits for future reference [10]. Thus in case of emergency situations they have to search for complete vehicular ad hoc networks to describe individual mobility behaviors.

The further contribution for our proposed system for mining messages in VANET for managing emergency situations is organized as follows. Further discussion describes the work done regarding macroscopic and microscopic models for communication of VANET networks.

The microscopic models based on particle that includes vehicles dynamic movement. The mesoscopic models based on gas kinetic determines distance for speeding up limit according to the traffic [11] [12] [13]. The macroscopic models based on fluid dynamic including biological or socio economic systems extends to vehicle and pedestrian traffic applications.

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II. Related Work

The classification of mobility models generally classified as three categories of macroscopic, mesoscopic, and microscopic models. A large number of models are available for microscopic level mobility [14]. In this category, synthetic models such as random walk and random waypoint and survey-based models are often unable to provide modeling of motion patterns even though they can be very complex. Among them, some of the well-known mobility models like random waypoint fail to capture the steady state and realistic mobility behaviors [15]. Consequently, the trace-based approach attempts to extract mobility models from real mobility traces by approximating the movements based on the observed movement patterns. In mesoscopic level mobility the model vehicle transitions between different areas in a small part of the city. The area of civil engineering they have models for targeting at predicting the traffic for providing safety driven applications. In microscopic level individual mobility model have limitations for obtaining global mobility patterns [16]. Mathematical equations that precise the above models are very complex due to individual mobility.

The traffic dynamics have many issues according to driver traffic congestion etc. there are different kinds of congestion in traffic according to driving speed [17]. Conditions for limiting the speeding up of traffic which considers pedestrians, vehicle traffic and mood swings of drivers.

Quality of service for wireless networks allocates networks limited resources. Estimation of spatial temporal traffic load and activity at all networks coverage area [18] [19]. It uses markov renewal process for modeling mobility and next cell transition.

In another markov jump process model the vehicles move into the system and transits from one area to other area and atlast moved into the system which includes partitioned areas in the system [20] [21]. The entry and transition from one state to other describes the dynamic behaviors of vehicles mobility.

III. Preprocessing and Modeling Vehicular Motion Traces

Mobility track logs for taxis using GPS receivers which reports interval timings between real time scheduling and physical movements of taxis by recording. Rather than tracking other mode of transport using its transport time and its distance of operation taxis are have extensive coverage throughout city [22]. GPS devices are used for locating the moving taxis and GPRS modules helps recording timestamps for running taxis using latitude and longitude coordinates.

Processing of linear interpolation method to locate taxis information and traces the moving taxis varying with time. As all the taxis may not report concurrently with similar frequency data preprocessing eliminates artificial and inaccurate information [23]. So data obtained from preprocessing methods plot the trajectories of all taxi data.

In very dense traffic intersection locations it is very difficult to trace the streams of trafficking from area to area. Markov jump process is used for modeling the transition of modeled vehicle transition from area to area.

While processing the data for two different aspects of time and location it traces the records of continuous mobile trajectory throughout the day.

During area partition first the vehicle transit between vehicular mobility in areas considers road and city structure. While modeling the vehicular mobility and distributions the positions of key intersections and plots boundaries and centers of partitioned areas which uses decomposing method for given space.

When a vehicle does not tracks in a area for the period of more than 10 minutes then it is said to be departed from the system and will be considered here afterwards as a moving vehicle into the system and results in area partition [24]. It also tracks parameters of vehicles from unmodeled areas and relates its area in the system.

We first counts number of vehicles moving from in and out of modeled areas and the vehicles residence time at a particular area by averaging its durations [25]. By dividing the number of vehicles arriving from modeled areas we can obtain switching probability matrix.

The sufficiency of vehicles and most active vehicles in a time period are relatively stable. The mean time for arrival of vehicular movements are aggregated which counts all the modeled areas and vehicles [26] [27]. The travelling time for vehicles varies according to time to time like changes are very different from midnight to early morning to evening hours. The traffic duration for vehicles differ from city to city thus the observation timing for modeling those cities are also differs [28].

For validating the trace selection we have to approach the model and training the data model to describe rest part of trace [29]. Tracing divided into two equal parts with equal time. First half trace used for training data to obtain parameters. Second half for validation data for validating model and comparing results calculated from the tracked results.

Previous methods uses poisson process for obtaining arrival rate of vehicles and aggregates its arrival method. Mean arrival rate is the metric for validating timestamp for one day. Thus those existing models interpret system level performance and vehicular network dimensions time variance and behaviors of individual mobility. Such metrics used for mean value calculation for arrival and departure of vehicles.

These functionalities of traffic essentials which can be monitored thoroughly are the success of modern and industrialized society essentials. They involves increasing individual factor problems that expands to infrastructure according to its affordability and effective turn into parking lots etc.

IV. Mining Messages from Vanet Distribution

In the vehicular ad hoc networks usually the vehicular distribution and performance will be evaluated for communication and modeling purpose. In our proposed system we can create an effective communication between the vehicles and our modeling system. In association with previous microscopic and macroscopic modeling for

locating moving taxis using GPS devices the proposed system collects various data and responds t it with necessary situations like accidents, natural calamities, traffic etc.

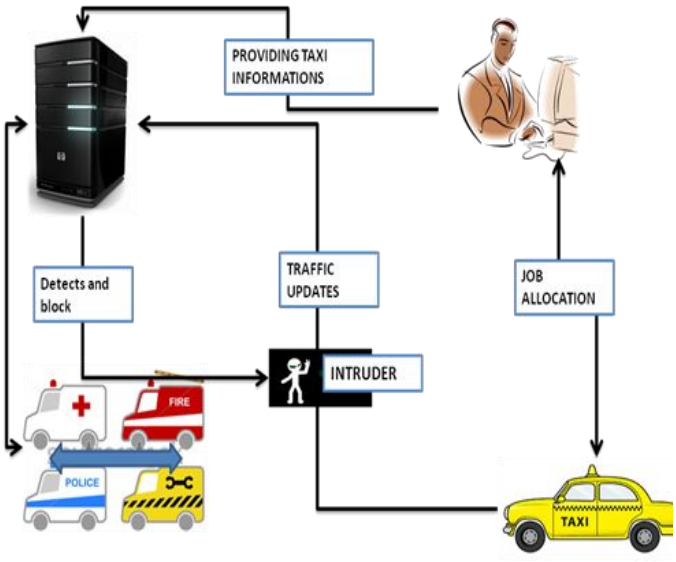

Fig.1 Architecture diagram for mining messages in vehicular ad hoc network.

Further it is extended by creating database that collects information of all the vehicles location, their plot information, timestamps of last location the vehicle is traced [30]. Information furnished in the database can help for emergency services like ambulance, fire service etc. If in case of emergency when an ambulance is needed then through the message mining technique in VANETs the last timestamp of the ambulance is traced and further information for tracking the ambulance exact location area like vehicles moving area city traffic information everything will be determined.

In wireless communications proposed in intelligent transportation systems with radio modem communication on different frequencies used for different range of communication mode. Vehicles made capable for vehicle electronics using computer processors in a network of programmable modules. They are fixed with microcontroller and programmable logic controller for transmitting messages and updating system to current trend. Even if any wrong information furnished with a particular vehicle it can be compared with other possibly nearer vehicles and checked its accurateness.

Vehicles automotive information can be checked through GPS maps using specially designed software and through internet. In a minimal traffic navigation WiFi based device locating in big campuses can be effectively done. Ad hoc networks communication used for position based routing for improvised traffic safety.

From Fig.1 we infer details for mining messages the first step is to furnish each and every detail to be stored in the networks database. Particularly that database should be dynamic so that it matches and updates the time by time information regarding the moving vehicles around the city and can plot GPS locations for lively report of traffic. Each and every single vehicle should update information about their location area and current traffic around them [31] [32]. The subsequent vehicles in serial to same area will provide modified updates time to time. Thus mining messages generates detailed determination of vehicles status by analyzing all the subsequent vehicles coordinated updates.

Through message mining emergency situations can be handled in appropriate way. With the help of all instant updating of vehicular distribution information we can choose accurate and shortest path and provide service on time without unnecessary delay. By this rapid uninterrupted services provided for handling VANET prevents national loss also.

In case of emergency situations if any intruders tend to attack any vehicle transmit from or through the system network then we can handle it in a precise way. As system side by side scrutinize information furnished by one vehicle with the other vehicles which is possibly matches the parameters such as same area crossing same intersection points etc we can easily detect attacks and take appropriate actions legitimately.

V. HANDLING EMERGENCY SITUATIONS

In an ad hoc network of vehicular distribution transmitting messages about vehicular moving positions from wireless sensor networks are in certain degree associated with intelligent transportation systems. Comparatively these are handled with input messages sending simultaneous vehicular information updates. The emergency server constantly keeps tracks of emergency alerts and quickly takes necessary renewal actions for managing such situations.

Emergency service will also handle message routing for approaching vehicle which struck with any emergency situations. If any vehicle needs any emergency help then the system can easily determine the maximum nearest possible vehicle and send them to the vehicle which is in need of help.

With discrete information provided from vehicles current updated messages needed for that route will be sent to that vehicle [33] [34]. While sending such updates it will provide simultaneous input messages from other vehicles. Taxis furnish traffic information to server and current job allocated to that particular vehicle and shares information about emergency vehicles. So that the server immediately

responds to the emergency need and takes essential action immediately.

Governing and rendering appropriate emergency situation handling in vehicle ad hoc networks also includes detection of intrusion and taking appropriate measures for them. Intrusion detection system can be any application or a device that continuously monitors the network and individual systems activities for malicious exertion of intruders [35]. It comprises of attack detection, confidentiality rate, consistency of updates received from taxis.

Before mining messages from databases its security level and confidentiality of data is verified. When any vehicle updates received it undergoes several levels of attack detection and verification done from various resources such as GPS, intersection for traffic etc. Finally it undergoes intrusion detection and the security is substantiated ultimately.

VI. CONCLUSION

In this model rather than macroscopic, mesoscopic and microscopic level vehicular mobility validation of performance and distribution of vehicular network. As we imply VANETs the effectiveness of analysis and dimensioning network performance. In emergency situations we mine messages from updated and furnished database and handle any kind of inevitable emergency situations. As the rapid services of vehicular networks take care of any emergency needs such as natural calamities, accidents or any inadequate traffic problems the message mining helps finding and solving it instantly. It also deserves determination of accurate and shortest path for vehicles transmit distribution and avoids unnecessary delays. It also helps in exertion of false or inaccurate information provided by vehicles by comparing with other possibly nearer vehicles information. It also can be located with traffic congestions and intersection of vehicle positions. Even intrusion of any attackers can also be detected and solved then and there.

REFERENCES

[1] M. Khabazian, S. Aissa, and M. Mehmet-Ali, "Performance modeling of message dissemination in vehicular ad hoc networks with priority," *IEEE J. Sel. Areas Commun.*, vol. 29, no. 1, pp. 61–71, Jan. 2011.

[2] G. Dimitrakopoulos and P. Demestichas, "Intelligent transporta-tion systems," *IEEE Veh. Technol. Mag.*, vol. 5, no. 1, pp. 77–84, Mar. 2010.

[3] J. Zhao and G. Cao, "VADD: Vehicle-assisted data delivery in vehicular ad hoc networks," in *Proc. 25th IEEE INFOCOM*, Barcelona, Spain, Apr. 2006, pp. 1–12.

[4] F. Li and Y. Wang, "Routing in vehicular ad hoc networks: A survey," *IEEE Veh. Technol. Mag.*, vol. 2, no. 2, pp. 12–22, Jun. 2007.

[5] A. Abdrabou and W. Zhuang, "Probabilistic delay control and road side unit placement for vehicular ad hoc networks with dis-rupted connectivity," *IEEE J. Sel. Areas Commun.*, vol. 29, no. 1, ap. 129–139, Jan. 2011.

[6] J. Harri, F. Filali, and C. Bonnet, "Mobility models for vehicular ad hoc networks: A survey and taxonomy," *IEEE Commun. Surv. Tutor.*, vol. 11, no. 4, pp. 19–41, Dec. 2009.

[7] D. Helbing, "Traffic and related self-driven many-particle sys-tems," *Rev. Mod. Phys.*, vol. 73, no. 4, pp. 1067–1141, 2001.

[8] Y.-C. Chen, J. Kurose, and D. Towsley, "A simple queueing net-work model of mobility in a campus wireless network," in *Proc. 3rd ACM Workshop Wireless of the Students, by the Students, for the Students*, Las Vegas, NV, USA, Sep. 2011, pp. 5–8.

[9] L. Breuer, *From Markov Jump Proceses to Spatial Queues.* Boston, MA, USA: Kluwer Academic Pubulication, 2003.

[10] H. Abu-Ghazaleh and A. S. Alfa, "Application of mobility pre-diction in wireless networks using Markov renewal theory," *IEEE Trans. Veh. Technol.* , vol. 59, no. 2, pp. 788–802, Feb. 2010.

[11] W.-Y. Lee and I. F. Akyildiz, "Spectrum-aware mobility manage-ment in cognitive radio cellular networks," *IEEE Trans. Mobile Comput.*, vol. 11, no. 4, pp. 529–542, Apr. 2012.

[12] P. Fazio and S. Marano, "Mobility prediction and resource reser-vation in cellular networks with distributed Markov chains," in *Proc. 8th Wireless Commun. Mobile Comput. Conf.*, Limassol, Cyprus, Aug. 2012, pp. 878–882.

[13] D. Wang and A. A. Abouzeid, "On the cost of knowl-edge of mobility in dynamic networks: An information-theoretic approach," *IEEE Trans. Mobile Comput.*, vol. 11, no. 6, ap. 995–1006, Jun. 2012.

[14] R. R. Roy, "Random walk mobility," in *Handbook of Mobile Ad Hoc Networks for Mobility Models.* New York, NY, USA: Springer, 2011, ap. 35–63.

[15] J. Yoon, M. Liu, and B. Noble, "Random waypoint considered harmful," in *Proc. IEEE INFOCOM* , San Francisco, CA, USA, Apr. 2003, pp. 1312–1321.

[16] A. Rojas, P. Branch, and G. Armitage, "Experimental validation of the random waypoint mobility model through a real world mobility trace for large geographical areas," in *Proc. 8th ACM Int. Symp. MSWiM*, Montreal, QC, Canada, Oct. 2005, pp. 174–177.

[17] W.-J. Hsu, K. Merchant, H.-W. Shu, C.-H. Hsu, and A. Helmy, "Weighted waypoint mobility model and its impact on ad hoc net-works," *ACM SIGMOBILE Mobile Comput. Commun. Rev.*, vol. 9, no. 1, pp. 59–63, Jan. 2005.

[18] Q. Zheng, X. Hong, and J. Liu, "An agenda based mobility model," in *Proc. 39th ANSS*, Huntsville, AL, USA, Apr. 2006,

[19] M. Musolesi and C. Mascolo, "A community based mobility model for ad hoc network research," in *Proc. 2nd Int. Workshop REALMAN*, Florence, Italy, May 2006, pp. 31–38.

[20] T. Litman. (2009). Safe travels: Evaluating mobility management traffic safety impacts. Transportation Research Board [Online]. Available: http://www.trb.org/Main/Blurbs/155263.aspx

[21] T. Litman, "Measuring transportation: Traffic, mobility, and acces-sibility," *ITE J.*, vol. 73, no. 10, pp. 28–32, Oct. 2003.

[22] M. Behrisch, L. Bieker, J. Erdmann, and D. Krajzewicz, "Sumo-simulation of urban mobility: An overview," in *Proc. 3rd Int. Conf. Adv. Syst. Simul.*, Barcelona, Spain, Oct. 2011, ap. 55–60.

[23] J. Yoon, B. D. Noble, M. Liu, and M. Kim, "Building realistic mobility models from coarse-grained traces," in *Proc. 4th Int. Conf. MobiSys*, Uppsala, Sweden, Jun. 2006, pp. 177–190.

[24] M. Kim, D. Kotz, and S. Kim, "Extracting a mobility model from real user traces," in *Proc. 25th IEEE INFOCOM*, Barcelona, Spain, Apr. 2006, pp. 1–13.

[25] N. Banerjee, M. Corner, D. Towsley, and B. Levine, "Relays, base stations, and meshes: Enhancing mobile networks with infrastruc-ture," in *Proc. 14th ACM MobiCom*, San Francisco, CA, USA, Sep. 2008.

[26] F. Bai and B. Krishnamachari, "Spatio-temporal variations of vehi-cle traffic in VANETs: Facts and implications," in *Proc. 6th ACM VANET*, Beijing, China, Sep. 2009.

[27] H. Zhu *et al.*, "Impact of traffic influxes: Revealing exponential inter-contact time in urban VANETs," *IEEE Trans. Parallel Distrib. Syst.*, vol. 22, no. 8, pp. 1258–1266, Aug. 2011.

[28] K. Lee *et al.*, "Max-contribution: On optimal resource allocation in delay tolerant networks," in *Proc. 29th IEEE INFOCOM*, San Diego, CA, USA, Mar. 2010, pp. 1–9.

[29] H. Zhu *et al.*, "Recognizing exponential inter-contact time in VANETs," in *Proc. 29th IEEE INFOCOM*, San Diego, CA, USA, Mar. 2010, pp. 1–5.

[30] Y. Li, D. Jin, Z. Wang, L. Zeng, and S. Chen, "Exponential and power law distribution of contact duration in urban vehicular ad hoc networks," *IEEE Sig. Process. Lett.*, vol. 20, no. 1, pp. 110–113, Jan. 2013.

[31] F. P. Kelly, "Networks of queues with customers of different types," *J. Appl. Probab.*, vol. 12, no. 3, pp. 542–554, Sep. 1975.

[32] D. S. Menasche, A. A. A. Rocha, B. Li, D. Towsley, and A. Venkataramani, "Content availability and bundling in swarm-ing systems," in *Proc. 5th CoNEXT*, Rome, Italy, Dec. 2009, ap. 121–132.

[33] D. Wu, Y. Liu, and K. W. Ross, "Queueing network models for multi-channel P2P live streaming systems," in *Proc. 28th IEEE INFOCOM*, Rio de Janeiro, Brazil, Apr. 2009, pp. 73–81.

[34] F. Ashtiani, J. A. Salehi, and M. R. Aref, "Mobility modeling and analytical solution for spatial traffic distribution in wireless multimedia networks," *IEEE J. Sel. Areas Commun.*, vol. 21, no. 10, ap. 1699–1709, Dec. 2003.

[35] K. Kim and H. Choi, "A mobility model and performance analysis in wireless cellular network with general distribution and multi-cell model," *Wireless Personal Commun.*, vol. 53, no. 2, pp. 179–198, 2010.

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