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**Department of Computer Science & Engineering**

**Minor Project First Defense Report Format- Literature Review**

**(CSE- 2018-2022)**

**Project Title:**

**Group Number:**

**Mentor Name:**

| **S.No.** | **Paper Title** | **Dataset Used** | **Algorithm**  **/Methodology/Model** | **Limitation of the Model** | **Summary in your words** | **Future Scope** | **Cite in APA style** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1. | An Approach for predicting vehicle velocity in combination with driver turns | The main data source is the  conducted Field Operational Test (FOT). Smartphones track approximately 90 taxis  and 20 commercial vehicles equipped with an internal  combustion engine in the area of Munich and Upper  Bavaria. Besides the mobility data acquisition, an electric vehicle is simulated in a smartphone application . The  original GPS, speed information, and the simulated data are  transferred to the server infrastructure. The  sample time of the GPS data as main information is one  second. The FOT started in 2013 and was in progress till 2016 . As  additional data source, live traffic information is used.Traffic flow information is accessed at regular intervals  of approximately 15 min for the corresponding regions.  The data is stored in a PostgreSQL database.  For map-based approach, OSM is used which provides open source map data with road and location-specific  attributes. These attributes contain geometrical information, maximum allowed speed, position of traffic signals,  stop signs, and road class amongst others. Since original  OSM data are not routable, the map data are converted  using OSM2PO . As a result, road segments are split at  intersections, which enables the map-based approach. | The concept provides a two-stage approach. The first stage is the prediction of upcoming turns and trip segments based on the historical features and the currently driven road segments. The second stage uses this information to predict the vehicle’s speed. The dataset obtained from Field Operational Test is utilized for the above mentioned steps. The approach combines a trip prediction algorithm with a speed profile prediction. | 1. The model mainly emphasizes on prediction of trip and speed of vehicle which reduces the efficiency. 2. Calculation of velocity of vehicle is completely based on prediction and other factors like Traffic flow, inner city mobility etc. 3. The model is not suitable for new trips as it cannot predict the new destination. | The model revolves around the two main stages,  The first stage is the prediction of upcoming turns and trip segments based on the historical features and the currently driven road segments. The second stage uses this information to predict the vehicle’s speed. The model is completely based on the prediction, it analyses the data obtained from Field operational testing in order to detect the future turns, trip and vehicles velocity. The main set back for the model is, if the destination is unknown, the preview is limited to the end of the road section, which limits the user to a particular region. | 1. Displaying Points of Interests as per user will make the model more user friendly. 2. The major future scope of this model is, it can be used as a virtual driving assistant. | Lohrer, J., & Lienkamp, M. (2016). An approach for predicting vehicle velocity in combination with driver turns. *Automotive and Engine Technology*, *1*(1), 27-33. |
| 2. | Monitoring Vehicle speed using GPS and Categorizing driver. | Eleven attributes from speed data have been considered to categorize the driver, these attributes are Mail id, user id, project id, maximum speed, distance, time , average speed, eligibility, accuracy , GPS Satellites | Eleven attributes from speed data have been considered to categorize these drivers, these eleven attributes (Mail id, user id, project id, maximum speed, distance, time , average speed, eligibility, accuracy , GPS Satellites)  are recorded for effortlessness, these attributes are utilized based on GPS service of the smartphone and fire base to predict the speed of vehicle and categorize the driver. | 1. The methodology used in this model limits its implementation in the real world. 2. The model is completely dependent on different API in order to give desired output. 3. The Accuracy of the model is unknown. 4. The output given to the Director/admin is in raw form and needs to be analyzed before implementation. | The proposed work is an endeavor to control speed of the vehicle structured with Pc programming to empower the outsider or proprietor to get the area, speed and action of the driver. GSM/GPRS are utilized to track the objects and provide the up to date data. This data is stored in the server and sent to the users. | 1. The model is limited only to public transport vehicles and other commercial vehicles, while it can be modified to keep track of personal vehicles as well. 2. Displaying the data in proper analysed form to the user, to save users time. 3. The model can be modified into a virtual driving assistant. 4. An alarm mechanism can also be embedded in this app so that when a person crosses the speed limit, an alert is displayed on the screen. | Reddy, N. R., & Subhani, S. (2019). Monitoring Vehicle Speed using GPS and Categorizing Driver. |
| 3. | Vehicle tracking and speed estimation from the traffic videos | The available dataset has been captured by stationary cameras located at urban intersections and free ways.Following are details of the dataset:  • The Track 1 dataset contains 27 one-minute 1080p videos (1920x1080) recorded at 30 frames per seconds (fps). Those videos are captured at 4 different locations, locations 1 and 2 being highway and 3 and 4 intersection locations, respectively.  • The Track 2 dataset involves 100 videos, each approximately 15 minutes long, recorded at 800x410 resolution and 30 fps.  • The Track 3 dataset has 15 videos of 1080p resolution recorded at 30 fps, in four different locations. Each video is 0.5 to 1.5 hours long. | The method takes a detect-then-track approach and can use object detections from any vehicle detection algorithms input; the vehicle is tracked using vehicle tracking algorithms enhanced with optical-flow based features to provide robust vehicle trajectories. The method takes a data-driven approach to estimating the speed of vehicles and relies on several strong assumptions. First, the camera recording traffic should be static, Secondly, assume that the maximum speed limit is known for the road segments captured in the footage and at least one vehicle drives on the segment at that speed. | 1. The model is only able to detect the constant speed of the moving vehicle and sudden variation in the speed of vehicle goes undetected. 2. The predictive speed calculated by the model suffered from both lower detection rate and high root mean square error than the constant speed model. 3. The performance of the vehicle depends on the quality of video and other physical factors like wind and position of the camera. | The model was basically designed to aid the traffic department in empowering the traffic rules, to prevent vehicles from rash driving and over speeding. the basic approach of the model to track the vehicles using vehicle detection algorithms and then detecting the speed of vehicles using optical flow and speed estimation algorithms. In order to predict the speed of a moving vehicle and track the vehicle the camera recording traffic should be static, which also adds ups as a downfall of the proposed model. Overall the approach used in the model was impressive but due to some factors the model faces challenges in the real world situations. | 1. The model can be improved and used by traffic police to empower traffic rules. 2. The model can be implemented in the vehicles in order to predict the speed of vehicles and speed of other vehicles passing users' vehicles, this will help users to claim for insurance in case of an accident. 3. The model finds its implementation in the virtual driving assistant. | Hua, S., Kapoor, M., & Anastasiu, D. C. (2018). Vehicle tracking and speed estimation from traffic videos. In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition Workshops* (pp. 153-160). |
|  | Speed Determination of Moving Vehicle using Lucas-Kanade Algorithm. | The dataset used for this model are the video sequences captured using a digital camera with 15 fps sample rate and resizing the images to 120 X160 pixel resolution. | The model implements the lucas-kanade algorithm which uses the video recording to determine the speed of moving objects. The optical flow of the recorded video is utilized by the lucas- kanade algorithm to get numerical values related to the rate of change of pixels and hence predicting the velocity of the vehicle. | 1. The output of the model depends on the quality of video recorded by the camera. 2. The model is good for calculating vehicle speed but will not be able to display it to the user in real time which limits its functionalities. | The model takes simple video file as input and calculates speed of vehicle using Lucas-kanade algorithm, which makes use of Optical flow of the input video to derive the necessary equations which are then replaced by the values as per rate of change of pixels will give the velocity of the moving vehicle. | 1. The model can be used in implementing a virtual driving assistant. 2. The model can be integrated with a speed alert system in order to alert drivers of crossing the speed limit. 3. The model can be used to calculate the speed of nearby vehicles. | Shukla, D., & Patel, E. (2013). Speed determination of moving vehicles using Lucas-Kanade Algorithm. *International Journal of Computer Applications Technology and Research*, *2*(1), 32-36. |
| 5. | SenSpeed: Sensing Driving Conditions to Estimate Vehicle Speed in Urban Environments | The data obtained from mobile phones, accelerometers and gyroscopes is analysed to calculate the velocity of the vehicle. Therefore, readings of the accelerometer and gyroscope serves as the dataset for the model. | The model implements Accelerometer and gyroscope readings to calculate the actual velocity of the vehicle, in order to obtain the vehicle speed, a series of the acceleration samples are taken and monitored by the accelerometer continuously. The position of a smartphone can be determined by using GPS. The average vehicle speed is utilized by the position and time interval from adjacent GPS data. Gyroscope data is used to detect the smoothness of roads.Modern motion sensors usually have 6 power modes, i.e. Idle Mode, Accelerometer Low Power Mode, Accelerometer Mode, Gyroscope Mode and Gyroscope & Accelerometer Mode. Energy consumption is the lowest when the motion sensor is running under Idle Mode, which is only 5μA. Besides, energy consumption is also relatively low when Accelerometer Low Power Mode is on, which is 10−140μA.There is no low power mode for gyroscopes. Once the gyroscope starts running, it consumes much more energy than the accelerometer, which is 3.6mA. Therefore, there are two important principles in reducing power consumption of Senspeed: Since the power consumption of a gyroscope is much higher than that of an accelerometer. Avoiding use of gyroscopes in order to reduce the power consumption is the better option; Since the low power mode is available when the sampling rate is low, a significant amount of energy could be saved by reducing the sampling rate of SenSpeed. | 1. We need to align the mobile phone in such a way that the y axis of mobile phone and vehicle point in the same direction. 2. The efficiency of the model is directly depending on the mobile phones alignment. | The models make use of mobile phones Accelerometer and Gyroscope to calculate the velocity of the moving vehicle, the readings of accelerometer are continuously observed for the same purpose. The basic drawback of the model is, in order to use an accelerometer for velocity calculation the mobile phone should be placed in such a way that the y-axis of the mobile phone and the vehicle are parallel.gyroscope is used to check the smoothness of the road but because it consumes more power than accelerometer ,it is preferred to use only accelerometer and not gyroscope this step optimize the power consumption. After performing various experiments on the model it was concluded that SenSpeed can estimate the vehicle speed in real-time with a low average error of 2.12km/h, while achieving 1.21km/h during the offline estimation. | 1. The model can be implemented in creating a virtual driving assistant. 2. An alert system can be integrated with the current model in order to help drivers to drive below the speed limit. 3. The model can be modified so that the device's alignment with the vehicle may have very little impact on the accuracy of the model. | Yu, J., Zhu, H., Han, H., Chen, Y. J., Yang, J., Zhu, Y., ... & Li, M. (2015). Senspeed: Sensing driving conditions to estimate vehicle speed in urban environments. *IEEE Transactions on Mobile Computing*, *15*(1), 202-216. |
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