Feature Extraction and Selection for Traffic Monitoring System using Machine Learning

SP. Maniraj, Abhishek Raj, Nitin Saseendran, Shashank Shekhar, Rohit Haridas

Abstract: Planning and Scheduling is very hard problem in real life. In transportation System such problem occure a lot as traffic congestion. This paper presents feature extraction, feature selection using machine learning based classification to make to provide alternatives to the flow of traffic and also to prevent road accidents. The traffic observance tasks square measure performed by analyzing strength of radio radiation received by mobile devices from beacons that square measure placed on opposite sides of a road. This approach is appropriate for crowd sourcing applications aimed toward reducing time period, congestion, and emissions. blessings of the introduced technique were incontestible throughout experimental analysis in real-traffic conditions.

Index Terms*: *congestion, incontestable

I. INTRODUCTION

Road traffic is a complex phenomenon, where various entities (pedestrians, cars, trucks, busses, tramps, bicycles, etc.) interact one each other, when using common infrastructure. The traffic management and control, due to infrastructure constraints and rising number of vehicles, is a complex task and requires application of dedicated algorithms together with precise traffic data (both historical and current) . The information about number of vehicles and their types is helpful in reducing travel times and emissions. Precise traffic data allows us not only to increase effectiveness of traffic control, but also to adapt management policy to changing conditions and predict infrastructure bottleneck. The precise traffic data can be provided by traffic monitoring systems that are usually integrated with road infrastructure. Such systems allow detecting and classifying the vehicles in selected areas by using data from sensors (inductive loops, video-detectors, magnetometers, etc.). A major drawback of the solutions integrated with infrastructure is a low flexibility and significant maintenance cost. To overcome these drawbacks, applications of new technologies (e.g., wireless sensor networks) in traffic monitoring are considered. Such solutions can facilitate installation and reconfiguration of the system. However, the cost is still significant.Thus, in this paper an alternative method was proposed, which was inspired by the crowd sourcing approaches and utilizes iBeacon techniques for vehicle detection and classification.

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Crowd sourcing is a distributed model, in which a crowd solves or helps to solve a complex problem. Crowd sourcing utilizes mobile workforce and unique features, which could be found in smartphones. Smartphones offer a great platform for extending existing applications due to multi sensing capabilities: geolocation, audio, and visual sensors. They could be used to provide precise data about current traffic at given location. In contrast to the approximation models proposed in where mobile device is situated inside a vehicle, this paper proposes a new system with mobile devices (smartphones) and beacons situated by the road. In order to detect vehicles, the proposed system measures signal strength of frames received from Bluetooth beacons.

II. LITERATURE SURVEY

The deep learning algorithm was first applied in image classification. Krizhevsky et al. proposed AlexNet, a deep convolution neural network that comprises eight learning layers. Specifically, AlexNet comprises five convolution layers and three fully connected layers. It achieved a top 5 classification error rate of as low as 15.3% when applied to classify images from the ImageNet dataset on the basis of dropout and random gradient descent. [1] In 2015, He et al. proposed the use of deep residual neural network to address the performance degradation caused by increasing the number of layers of the deep neural network to 152. To facilitate training, they used congruent mapping to directly connect the preceding output layer to the upper layer. The classification error rate of the deep residual neural network when used to classify images form the ImageNet dataset decreased to 3.6%, which is 5% less than the error rate achieved through human visual detection. [2] In 2015, Girshick et al. developed a region-based fast convolution neural network (FAST RCNN) that maps regions directly to the feature graph on the last convolution layer of the convolution neural network. FAST RCNN increased computational speed by transforming the target detection problem into a classification problem that is solvable by the convolution neural network. It yielded a map of 68% when used applied on the VOC2007 dataset. [3] In 2015, Girshick and He proposed a region-based faster convolution neural network (Faster-RCNN), which 2 aggregated feature extraction, proposal extraction, bounding box regression, and classification to detect targets with quasi real-time speed. The map of VGG-based Faster-RCNN reached 76.4% when used to classify images from the VOC2007 dataset. [4] In 2016, Redmon developed a target detection algorithm that was based on the regression method. The algorithm achieved a mAP of 57.9% in the VOC 2012 dataset on the basis of end-to-end network from image input to output target location and detected category. [5]

However, some methods for image detection and classification have been unable to keep up with the rapid development of intelligent monitoring, intelligent traffic, and other fields and the expansion of data sources for streetscape videos with high frame rate and definition and complex real scenes. Therefore a new method needs to be studied for the real-time detection and recognition of targets in streetscape videos. [6]

III. EXISTING SYSTEM

The existing system includes that all staff that conduct work related to traffic management system are a part of the engineering division within the public works department. Various task and responsibilities are carried out by staff. Traffic engineer and staff are engaged in various task.

In addition to the above sampling of tasks items, the Traffic Team has staff involved in numerous daily meetings to facilitate coordination with multiple departments on status of projects, inquiries, reviews and approvals for new developments, on-going construction activities, and many other strategic planning activities.Various functional sections within traffic monitoring has to be maintained manually. These includes : Traffic Operations & Safety – Traffic studies, data collection, capacity and safety analysis, special events, traffic control, project development, planning and programming, GIS asset management, public response etc. Traffic Signals – Maintenance and operations of signal system, inspections, cabinet evaluation program, overhead electrical, construction project inspection & management, signal planning and programming, GIS asset management, contractor coordination, utility locates etc. ITS / Communications – Maintenance and operations of citywide fiber optic infrastructure and network to all city facilities, ITS device planning, installation and maintenance, GIS asset management, and review, approval, inspection of fiber optic communications system installations by contractors Marking / Signing Shop – Maintenance and operations of 40,000 signs citywide (not including street name signs) and pavement marking program, operations of sign trucks for installations, marking equipment operations – paint trucks, paint carts, parking stall reviews, and project inspections & installations

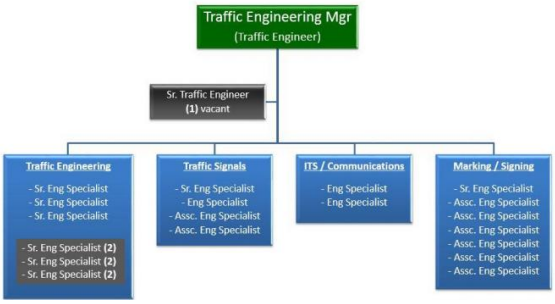

Fig.3.1 ROW construction management system

staff members that have duties devoted to the traffic signal system and ITS infrastructure are located at the MSC facility. This includes 6 full-time technician staff located in the signal shop, one full-time technician with primary signal system/timing responsibilities, and one Manager / Traffic Engineer with ¼ time dedicated to the system. Of these staff, two (2) of the 6 technician staff members are dedicated solely to ITS and communications infrastructure, and one additional signal technician is dedicated to full-time underground Traffic Utility Locate work during construction season (75% workload annually). An existing conditions organizational chart illustrating these staff, and the entire Traffic Team is mentioned in fig 3.1.The technical staff perform typical work hours covering time periods from 7AM to 5PM on a Monday through Friday schedule. Staff in the traffic signal shop overlap hours in the morning and afternoon to better cover traffic activity Currently, there are no 24/7 operations, nor staffing coverage during the remainder of the AM and PM peak traffic periods on a daily basis.Members of the traffic signal shop do rotate weekly (single staff member) to provide an emergency "on-call" staffing as needed for equipment failures, damaged equipment, power outages, facilities hit by contractors etc. These staff work on a "call-back" pay system and receive overtime pay for work performed outside normal business hours.

IV. PROPOSED SYSTEM

The existing system includes that all staff that conduct work related to traffic management system are a part of the engineering division within the public works department. Various task and responsibilities are carried out by staff. Traffic engineer and staff are engaged in various task.In the proposed system, various Intelligent Transportation System devices are implemented. The real time traffic on road is monitored by the camera which is imposed on traffic light or on side road side. The data is captured or gathered in the system and algorithm is implemented through which the data is processed based on the weather, traffic crowd and based on that statistics graph is generated and based on that certain action took place. architecture diagram is mention in fig 4.1

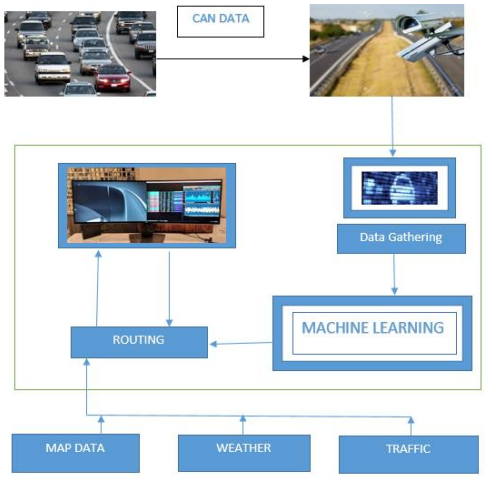

Fig.4.1. System Architecture diagram

Algorithm used to process the Data are as follows:

Decision tree-based classifiers : Decision Tree algorithm belongs to the family of supervised learning algorithms. ... The general motive of using Decision Tree is to create a training model which can use to predict class or value of target variables by learning decision rules inferred from prior data(training data) . Support Vector Machine : support-vector machines (SVMs, also support-vector networks) are supervised learning models with associated learning algorithms that analyze data used for classification and regression analysis.

Certain data process algorithm is mention in fig 4.2.

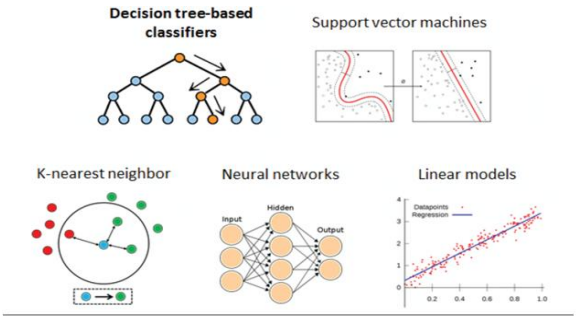

Fig.4.2. CAN Data processing algorithm

V. RESULTS

Our results indicated that the previous strategy performed slightly higher, though grouping opposite categories was less time overwhelming once making ready the dataset. in addition, analysis indices like the performing loss, precise match accuracy, and MAP were measured additionally to the coaching and prediction times. Our model performed well in terms of accuracy and time consumption, with few convolutional layers as a results of adding dropout and BN layers. in addition, a example for our system was developed to demonstrate the feasibleness of the model in terms of analyzing CCTV pictures. totally different models, together with progressive models like VGG and Res internet, were compared to our custom-built model. we have a tendency to trained individual categories and classified positive and negative categories.

VI. CONCLUSIONS

The vehicle organization is employed to change the method of traffic observation system by creating identification and classification of moving vehicles on road. The system uses image process of auto sample pictures to extract the options (area, perimeter, width, length). The options were passed as input to data processing toolkit to create a classifier model to classify new vehicles. Automatic traffic density estimation and vehicle classification through video process is incredibly necessary for traffic management particularly in mega cities. the advantages of the system square measure reduced human effort and errors in traffic observation, scale back the value of traffic observation system, scale back the time in conducting survey and analysis of knowledge and complete automation of traffic observation system. The script makes to examine that this answer isn't ideal, and having a tangle with foreground objects overlapping, additionally it doesn't have vehicles classification by varieties.

VII. CONCLUSION

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