Traffic Estimation and Routing Using K-meams Clustering Algorithm

Mihir A. Mishra[1], Kashyap B. Parmar[2], Manthan J. Surti[3], Paresh M. Chauhan[4]
[1] Department of Computer Engineering
[2] Department of Information Technology
[1]Assistant Professor, GIDC Degree Engineering College
[2, 3, 4]Assistant Professor, Laxmi Institute of Technology,Sarigam, Gujarat, India

Abstract-*Traffic analysis using K-means Clustering used for managing traffic load on particular path in Mega City.It is important to know the road traffic density real time especially in mega cities for signal control and effective traffic management. In this research work, we will use K-means Clustering to identify Vehicles on the road and we will use Euclidian distance to find Output Vehicle on Road. Using K-Means Clustering we can get several cluster defined Fig 4, and after averaging of several cluster we can get "average_cluster", that will be compared with all cluster. Similar cluster will be considered as "Vehicle Object" and other cluster will considered as a noise. We will remove this noise. And after that we can count the frequency of Vehicles on that Path, From that we can change the path of other Vehicles, if Frequency is greater than certain range for given time than it will automatically change the path of other Vehicles.*

Keywords-Traffic Estimation, Euclidian distance, K-Means Clustering.

I. INTRODUCTION

This research is used for assigning time-slots to a given set of courses. It allow us to manage perticular traffic using Current Traffic Image. So, Congestion less Routing will be possible The major cause leading to traffic congestion is the high number of vehicle which was caused by the population and the development of economy. Traffic congestion is a condition on road networks that occurs as use increases, and is characterized by slower speeds, longer trip times, and increased vehicular queuing. The most common example is the physical use of roads by vehicles. When traffic demand is great enough that the interaction between vehicles slows the speed of the traffic stream, these results in some congestion .As demand approaches the capacity of a road (or of the intersections along the road), extreme traffic congestion sets in. When vehicles are fully stopped for periods of time, this is colloquially known as a traffic jam or traffic snarl-up. Traffic congestion can lead to drivers becoming frustrated and engaging in road rage. In order to avoid the congestion in the traffic. In traffic environments, Traffic Sign Recognition (TSR) is used to regulate traffic signs, warn the driver, and command or prohibit certain actions.

This research is used for assigning time-slots to a given set of courses. And allow us to manage perticular traffic using Current Traffic Image. So, Congestionless Routing will be possible.The constraints include avoiding clashes of time-slots, assigning appropriate no. of slots and no. of hours to the courses etc. there are two types of constraints. One is soft constraints and other is hard constraint. A soft constraint means the constraints which should be satisfied but not mandatory whereas the hard constraint means the constraints must be satisfied for a solution. In proposed representation we considered soft constraints which are 1) classes scheduled within preferred hours; 2) avoid long runs of consecutive lectures. Hard constraints are 1) All classes must be scheduled; 2) No classes/lecturers are allocated twice at same time.

II. REVIEW OF LITERATURE

Density, speed, and flow are the three critical parameters for road traffic analysis. High-performance road traffic management and control require real-time estimation of space mean speed and density as input for large spatial and temporal coverage of the roadway network. In Adaptive Traffic Control System which receive information from vehicle such as position and speed and then it utilize to optimize the traffic signal. The system specifies the use of onboard sensors in vehicle and standard wireless communication protocol Specified for vehicular applications. They implement various traffic Signal control Algorithms [1].Intelligent traffic system for VANET suggest that creation for smart city framework for VANET consisting of Intelligent Traffic Lights which transmit warning messages and traffic statistic. In That System Various Routing Protocol Has Been Discus And Compare. They suggest that AODB is best suited for Intelligent Traffic Light [2]. Author suggest in reference [3] the data forecasting model for transmitting data from one to other. This article studied about the dynamic traffic control system and based on radio propagation model for predicting path loss &link. The author suggests in reference [7]

Intelligence road Traffic signaling System. In that system OBUs used. OBUs used destination information for calculating load traffic on road for reducing the conjunction on road. The general belief is that it is more difficult to estimate and predict traffic density than traffic flow .In Intelligent Traffic Light and Density Control using IR Sensors and Microcontroller [4] the author propose that the delay of Signal not depend on traffic density. TheAuthor optimize the traffic using microcontroller this system reduce traffic jams problem cause by traffic light to extent. Thesystem contains IR Transmitter and IR Receiver. IR count the vehicles on the road Microcontroller generates the result. [8]Priority Based Traffic Lights Controller Using Wireless Sensor Network the author implements Adaptive Traffic control System based on (WSN) wireless sensor Network. In that System Time manipulation Used for controlling Traffic Light. This System Control Traffic over Multiple intersections. As such, it is becoming very crucial to device efficient, adaptive and cost-effective traffic control algorithms that facilitate and guarantee fast and smooth traffic flow that utilize new and versatile technologies. An excellent potential candidate to aid on achieving this objective is the Wireless Sensor Network (WSN). Many studies suggested the use of WSN technology for traffic control. In, a dynamic vehicle detection method and a signal control algorithm to control the International Journal of Computer Applications (0975 – 8887) International Conference on Quality Up-gradation in Engineering, Science and Technology (ICQUEST-2014) 14 state of the signal light in a road intersection using the WSN technology was proposed. In this paper, an intelligent traffic light control system based on WSN is presented. The system has the potential to revolutionize traffic surveillance and control technology because of its low cost and potential for large scale deployment. Wang, Cheng [1],their research was onUniversity Timetable Problem (UTP).They divide their research in two phase: one is the basic teaching tasks fortitude and another is the optimization of basic teaching time,Simplify the task of basic teaching methods and processes.Using genetic algorithm,they discussed the steps in detail of optimizing the basic teaching time,Stretches the algorithm of the fitness function, genetic crossover, variation and generation of initial population, and verified the value of the algorithm.

III. PROPOSED K-MEANS CLUSTERING FOR TRAFFIC

Routing Based On Traffic Analysis

k-means is one of the simplest unsupervised learning algorithms that solve the well known clustering problem. The procedure follows a simple and easy way to classify a given data set through a certain number of clusters (assume k clusters) fixed apriori. The main idea is to define k centers, one for each cluster. These centers should be placed in a cunning way because of different location causes different result. So, the better choice is to place them as much as possible far away from each other. The next step is to take each point belonging to a given data set and associate it to the nearest center. When no point is pending, the first step is completed and an early group age is done. At this point we need to re-calculate k new centroids as barycenter of the clusters resulting from the previous step. After we have these k new centroids, a new binding has to be done between the same data set points and the nearest new center. A loop has been generated. As a result of this loop we may notice that the k centers change their location step by step until no more changes are done or in other words centers do not move any more. Finally, this algorithm aims at minimizing an objective function knows as squared error function given by:

$$J(V) = \sum_{i=1}^{c} \sum_{j=1}^{c_i} \left(\left\| x_i - v_j \right\| \right)^2$$

where,

‘||xi - vj||’ is the Euclidean distance between xi and vj.

‘ci’ is the number of data points in ith cluster.

‘c’ is the number of cluster centers.

Algorithmic steps for k-means clustering

Let X = {x1,x2,x3,……..,xn} be the set of data points and V = {v1,v2,…….,vc} be the set of centers.

1) Randomly select ‘c’ cluster centers.

2) Calculate the distance between each data point and cluster centers.

3) Assign the data point to the cluster center whose distance from the cluster center is minimum of all the cluster centers..

4) Recalculate the new cluster center using:

$$v_i = (1/c_i) \sum_{j=1}^{c_i} x_i$$

where, ‘ci’ represents the number of data points in ith cluster.

5) Recalculate the distance between each data point and new obtained cluster centers.

6) If no data point was reassigned then stop, otherwise repeat from step 3).

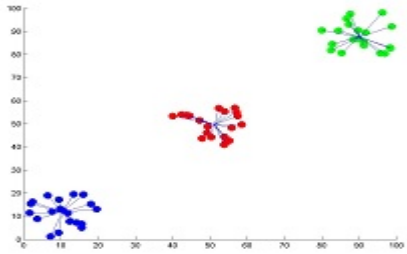

Fig. 1Showing Result of K-Means Clustering

Researchers now are so much interested in automatic real-time traffic congestion estimation tool as it is the most significant factor on which intelligent transportation systems are based.

In this system the source image is the RGB image which can be given by the users for getting the contour image and the vehicle count in output screen. The following code can be used to auto size of the output screen .Fig 2

In this research work, we will give input as RGB Image as source image:

Fig. 2 Source image

Some of the researchers have focused in their work on traffic flow estimation. It is measured as the rate at which vehicles pass a fixed point (e.g. vehicles per minute).

Fig 3 Gray Scale Image

The threshold image brightness or contrast of the grayscale image. In this system we can convert the grayscale image to threshold image.

Fig 4 Threshold Image

The Erode image also like the canny image it can be used find the edges with the darked lines.In our system the edges of the vehicles are detect with the darked lines Before converting the canny image to Erode image, the canny image will be destroied.

Fig. 5 Erode Image

The two types of output screens are displyed in this system. They are, 1) First output screen disply the output image. In this image will display the original RGB Image and in this screen the vehicles are boxed for the find the count. 2) Another output screen is the command prompt. In this command prompt will be open when the user run this system, in final stage after getting the output image the command promt will display the vehicle counts. 3) Introduction: Internal representation of batch configurations, Introduction to writing batch configuration scripts, Integration of an application into configuration management and GUI 4) Implementation: Classes used, Methods, Details about job management, runtime etc. 5) Disadvantage: Interpreted programming language, slower than C++ and V. FORTRAN. This tool cannot be used for real time application it will give only the simulation results.Matlab software is not free of cost. Our application requires the real time application software so opencv is used as the image processing technique.

Using K-Means Clustering we can get several cluster defined Fig 4, and after averaging of several cluster we can get "average_cluster", that will be compared with all cluster. Similar cluster will be consider as "Vehicle Object" and other cluster will considered as a noise. We will remove these noise. And after that we can count the frequency of Vehicles on that Path, From that we can change the path of other Vehicles, if Frequency is greater than certain range for given time than it will automatically change the path of other Vehicles.

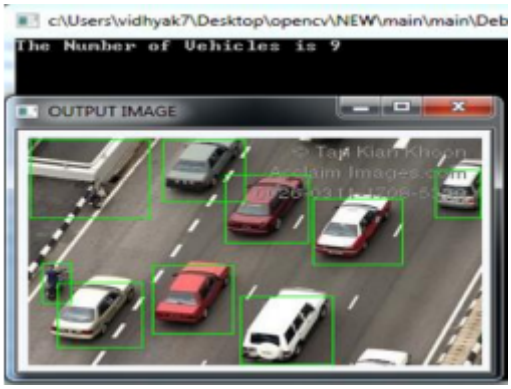

Fig. 7 Output Image

IV. CONCLUSION & FUTURE ENHANCEMENT

We conclude that using K-Means Clustering, we can get frequency of Vehicles on Particular Path. From that we can Routing the other vehicle.

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