

# A Review on Road Traffic Estimation Techniques

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## ABSTRACT

Traffic in urban areas of India has increased at great extent, which leads too many problems like time consumed in traffic, fuel consumption at signals. It also affect the emergency services. So in India we need system which can estimate traffic on different roads so that traffic can be distributed accordingly among other links or efficient signaling at traffic points can be done to reduce traffic jam at signaling points. So here in this review paper I present comments on various techniques which is presented by various authors recently.

**KEYWORDS:** Tweet based traffic detection; Image based traffic volume; traffic estimation using neural network; Video based traffic estimation

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## I. INTRODUCTION

Traffic congestion become a headache in big Indian cities. Due to lake of desired infrastructure and industrialization, the problem even increased at much extent. Also the growth of number of private vehicles on roads, inadequate public transport increasing the problem. So we greatly need some real time solution to estimate traffic on every links on this cities. This solution helps to know improvement in which links can reduce the congestion or to govern traffic signals based on traffic at each side of camera, or to provide best route to people for traveling so that load can be balance at various links. We review here various traffic estimation techniques based on image processing, Video Processing, Twitter and Machine Learning [1].

separate vehicles into packets based on density. They face problems in thresholding due to shadows of other objects like building, bridge. So they solved it using Otsu's multiple thresholding method.

Yasar Abbas UrRehman, Muhammad Tariq and Adam Khan [2] presents a system which detect traffic based on vehicle detection algorithm which is based on probability based vehicle detection algorithm then if traffic is present then number of object present in the image is calculated using sets of operations in sequence.

## II. IMAGE PROCESSING BASED TECHNIQUES

YogeshwarMutneja, DeepanshuSuneja, Pranav Maheshwari, Praneet Singh, [1] present solution based on volume of vehicles not the count and

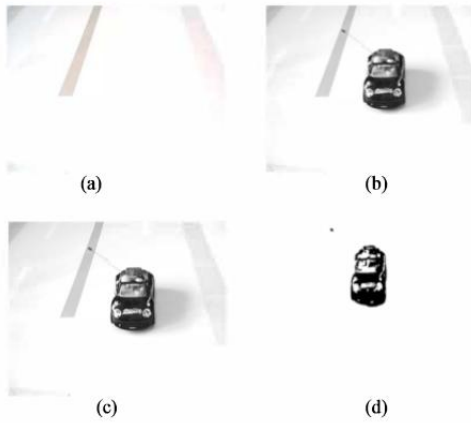


Figure 1. a) Empty road Image b) Road containing car Image c) Enhancement after median filtering of Image d) After frame subtraction of an image.

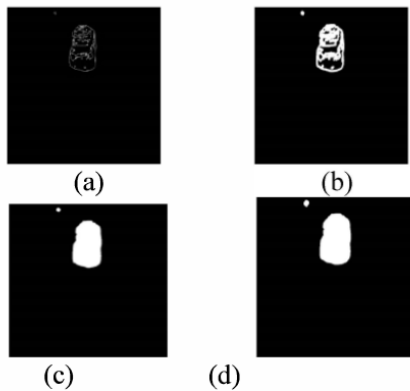


Figure 2. a) After edge detection b) Binary conversion and binary dilation c) Hole Filling (binary) d) Erosion (binary)

- 1) Enhancement using Median filter
- 2) subtract with background
- 3) Edge detection, Binary conversion,
- 4) Binary dilation,
- 5) Binary Hole Filling,
- 6) Binary Erosion.
- 7) Then counting number of 1's pixel which give volume of traffic.



Figure 3. Current Frame



Figure 4. Frame Subtraction



Figure 5. Edge Detection and Binary Dilation



Figure 6. Binary hole filling, erosion and area calculation

Based on it classify traffic into low, Medium and high classifiers.

### III. VIDEO PROCESSING BASED TECHNIQUES

JiajiaYU, MeiZUO[3] present a video based algorithm in which it separate out traffic based on setup of observation windows in different lanes and one for all lanes. As shown in Fig .7

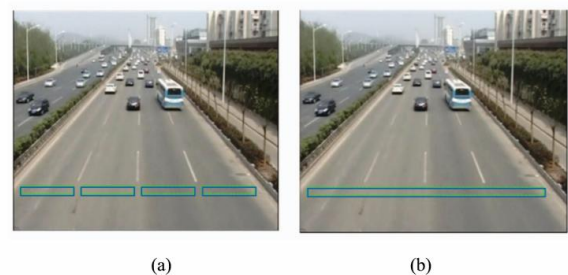


Figure 7. Two methods for the multi-lane road: observation window setup for: a) For each lane observation windows; and b) one observation window for all lanes.



The Normalized cross correlation (NCC) is used as the primary attribute to detect whether there is vehicle in observation window or not. As a secondary feature statistical parameter homogeneity [4] is used to minimize the effect of shadow.

Two close vehicles could not be separated by the algorithm the reason of the false-positive is the significant image change of the roof of large vehicle. But overall this method solve the moving shadow problem and give precise result for real time traffic flow detection

Anurag Kanungo, Ayush Sharma, ChetanSingla [5] observes various literature for measuring traffic and found simple and less costly even effective solution to measure traffic is based on the calculation of the intensity of image pixels which is calculated from using following steps.



Figure 8. Original Image

- 1) Crop desire portion of image.
- 2) Covert it to grayscale image.
- 3) Subtract image from background and store absolute value.
- 4) Add all pixels values.
- 5) Repeat it for each frame of video.
- 6) Finally divide it with the multiplication of the height of camera, number of pixels in cropped image and frames per second of camera.



Figure 9. Cropped and Gray Scale Image



Figure 10. Cropped and Gray scaled Background

So this method shows relative traffic measure at traffic signal. Which is efficient to automatize traffic signal based on traffic at each end.

#### IV. NEURAL NETWORK BASED TECHNIQUES

Mariano Gallo, FulvioSimonelli, Giuseppina De Luca, Christian Della Porta [6] present road traffic estimation using artificial neural network to estimate traffic on some road links to next's. This method used for cost effectiveness of video surveillance instruments where there is no instruments installed.

Using small network they have tested this approach on a small network and consider different neural network frameworks. And numerical analysis is promising traffic flows with acceptable errors.

Future research will be for complex ANN framework, real scale networks and demand profiles for training phase.

#### V. SOCIAL MEDIA BASED

Di Wang, Ahmad Al-Rubaie, John Davies and Sandra Stincic Clarke [7] Proposed Twitter based approach as Twitter is popular social media over internet where people exchange information easily and instantly. This instant information is used to traffic alerting to inform people who relates to it.

Challenges:

- 1) Limited Information (< 140 characters)
- 2) Informal symbols, incorrect spellings, use of tweet language
- 3) Only few data is relevant to topic. So hard to find and analyze tweet accurately.

TWEET HARVESTING FROM MULTIPLE SOURCES:

- 1) Tweets from official departments
- 2) Tweets from location

## Improved Tweet LDA

- 1) Latent Dirichlet Allocation [8]
- 2) Semi-Supervised LDA [9,10]
- 3) Incremental Learning [11,12,13]
- 4) Tweet pre-processing

## VI. CONCLUSION

In this paper various traffic estimation techniques implemented by different researchers have been explored with the advantages and disadvantages of each techniques. Various image processing techniques with each step results are shown in this paper for more understanding about the techniques. The accuracy depends on the dataset used and the methods used for the estimation of the road traffic.

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