Real-time Video based Vehicle Detection, Counting and Classification System

**Abstract:**

Traffic Analysis has been a problem that city planners have dealt with for years. Smarter ways are being developed to analyze traffic and streamline the process. Analysis of traffic may account for the number of vehicles in an area per some arbitrary time period and the class of vehicles. People have designed such mechanism for decades now but most of them involve use of sensors to detect the vehicles i.e. a couple of proximity sensors to calculate the direction of the moving vehicle and to keep the vehicle count. Even though over the time these systems have matured and are highly effective, they are not very budget friendly. The problem is such systems require maintenance and periodic calibration. Therefore, this study has purposed a vision based vehicle counting and classification system. The system involves capturing of frames from the video to perform background subtraction in order detect and count the vehicles using Gaussian Mixture Model (GMM) background subtraction then it classifies the vehicles by comparing the contour areas to the assumed values. The substantial contribution of the work is the comparison of two classification methods. Classification has been implemented using Contour Comparison (CC) as well as Bag of Features (BoF).method.

**3.1 Existing System**

A vehicle detection and classification system using time spatial image and multiple virtual detection line[6]. A two-step K nearest neighborhood (KNN) algorithm is adopted to classify vehicles via shape invariant and texture based features. Experiments confirm the better accuracy and low error rate of proposed method over existing methods since it also considers the various illumination conditions. People have designed such mechanism for decades now but most of them involve use of sensors to detect the vehicles i.e. a couple of proximity sensors to calculate the direction of the moving vehicle and to keep the vehicle count. Even though over the time these systems have matured and are highly effective, they are not very budget friendly. The problem is such systems require maintenance and periodic calibration.

**3.2 Proposed System**

The system could be used for detection, recognition and tracking of the vehicles in the video frames and then classify the detected vehicles according to their size in three different classes. The proposed system is based on three modules which are background learning, foreground extraction and vehicle classification as shown in fig. 1. Background subtraction is a classical approach to obtain the foreground image or in other words to detect the moving objects. We have proposed an adaptive video based vehicle detection, classification, counting for real-time traffic data collection. The proposed system was built using python programming language and OpenCV. The main objective for developing this system is to collect vehicle count and classification data. So that we can build intelligent transportation network based on historical traffic data. The proposed system can engender traffic data by detecting, classifying, counting It’s a plug & play system and applied YOLO algorithm as a background subtraction technique. The proposed system was tested at different six locations in Hyderabad under different traffic and environmental conditions.

**SYSTEM REQUIREMENTS SPECIFICATION**

**4.6 Hardware Requirements**

* **System :** Pentium IV 2.4 GHz.
* **Hard Disk :** 40 GB.
* **Floppy Drive :** 1.44 Mb.
* **Monitor :**  14’ Colour Monitor.
* **Mouse :** Optical Mouse.
* **Ram :** 512 Mb.

**4.7 Software Requirements**

* **Operating system :** Windows 7 Ultimate.
* **Coding Language :** Python.
* **Front-End :** Python.