Proceedings of 1st Shri Chhatrapati Shivaji Maharaj QIP Conference on Engineering Innovations
Organized by Shri. Chhatrapati Shivaji Maharaj College of Engineering, Nepti, Ahmednagar
In Association with JournalNX - A Multidisciplinary Peer Reviewed Journal, ISSN No: 2581-4230
21st - 22nd February, 2018

VEHICLE DETECTION USING HAAR CASCADE

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Abstract:
Vehicle detection is an important part of traffic inspection system. In this paper we outline a vehicle detection technique which could be used in vehicle inspection system. An intelligent vehicle inspection system uses an advance features with electronic devices which are used for analysis the traffic problem. So the first step is to detect the vehicle.The system uses Haar like feature-cascading technology.Its a machine learning technology which uses positive and negative images for training purpose.
Keywords-vehicle detection, traffic inspection, Haar like feature, Machine learning.

I. Introduction:

Nearly 1.3 million people die in road crashes each year, on average 3,287 deaths a day,according to the association for safe road travel website. Out of which one fourth accidents can be avoided if proper road surveillance system are installed. Developing countries like India bear a large amount of problem due to lack of traffic observation system.Thus having a good system can save many life's and Money. Haar cascading classifiers is an effective object detection method proposed by Paul Viola and Michael Jones. It is a machine learning based approach where a cascade function is trained from a lot of positive and negative images. It is then used to detect objects in other images. It basically considers adjacent rectangular regions at a specific location in a detection window, sums up the pixel intensities in each region and calculates the difference between these sums. This difference is then used to categorize subsections of an image. In the detection phase of the Viola Jones object detection framework, a window of the target size is moved over the input image, and for each subsection of the image the Haar-like feature is calculated. This difference is then compared to a learned threshold that separates non-objects from objects. Because such a Haar-like feature is only a weak learner or classifier (its detection quality is slightly better than random guessing) a large number of Haar-like features are necessary to describe an object with sufficient accuracy. Thus Haar like feature can be used for detection of vehicle which are captured by camera

II. Haar like Feature:

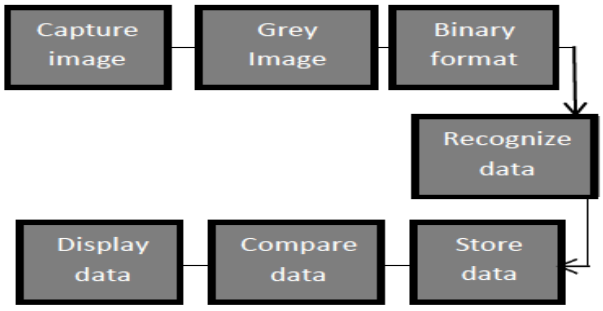
Haar like features or rectangular filter haar Provide information about the distribution of the gray levels of two adjacent regions in an image.

Figure: Example of Haar like Feature

The first step in calculating haar features is the use of the concept of the integral image introduced by Viola and Jones, which gives a representation of an input image and reduces the computation time of these features. The speed of the integral image in the calculation shows a rectangular sum using only four references, then the difference between two adjacent rectangles, can be calculated with only six references and eight for three Rectangles.

ii (x, y)=∑i(x',y'') with:
ii (x,y) Is the integral image.
i(x,y) Is the original image.

III. Block Diagram:



IV. Working:

The camera will capture the view it can be placed anywhere were the surveillance system is to be installed either on busy roads, tolls or flyover.The views captured by camera would be converted to gray scale image first for haar like effect then it is converted in binary format for better manipulation of data further the data would be used for recognizing purpose whether the vehicle is present or not then the stored data would be used to compare with raw data provided that is positive and negative images.which would be used for comparison purpose thus depending on presence of vehicle or not in the view captured by camera corresponding required output would be displayed. It's a basically machine learning based technique which uses a set of positive and negative images for training purpose. Thus this method is quite

fast and effective in detecting cars and other vehicle in real time CCTV footages.

V. Ease of use.

Vehicle detection using Haar cascading uses rectangular blocks rather than manipulating with pixel which makes the technology to compute the algorithm very fast that is at real time. Thus we are able to detect the vehicle as soon as it comes in view of camera. Which also makes the algorithm robust. Using RGB pixel color in color images, can not be used to achieve high frame rates. Our system achieves high frame rates working only with the information present in a single grey-scale image. Thus these alternative sources of information is also integrated with our system to achieve even higher frame rates. Thus an automated traffic surveillance system equipped with sensors can be used to reduce accidents increase in preliminary transportation infrastructure system on more number of roads or flyovers can solve these problems completely by a large margin. Without continues human traffic surveillance.

VI. Conclusion

The proposed vehicle detection system has collected efficient algorithms in terms Of image processing and in terms Machine Learning. The algorithm makes the proposed rapid and robust system for the detection of vehicles in real time. However, several improvements can be made to this single object detection system to allow it multi object detection (vehicle, humans etc) robust, fast and usable in real applications of road safety. These improvements will be the objective of future work.

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