SURVEY ON CAR DETECTION IN LIVE VIDEO INCORPORATED WITH MACHINE INTELLIGENCE

Bechra Nikita[1], Prof. A. R. Kazi[2]

[1] Student, Computer Engineering, Gujarat Technical University, Gujarat, India
[2]Assistant Professor, Computer Engineering, Gujarat Technical University, Gujarat, India

ABSTRACT

In this research focuses on HOG and SVM algorithm allowing further insights into their internal operation. After giving a brief introduction to HOG Algorithm in detail. The Second section introduces the different type of SVM. To increase accuracy of feature extraction we include zero order and second order gradient.SVM algorithm intend of HOG algorithm because HOG algorithm have some limitation to detect object it is mainly used for detecting human or vehicle while SVM is higher than HOG algorithm in which we can detect human as well as vehicle.

Keywords: - *Vehicle detection, Histogram of oriented gradients (HOG), machine learning, SVM Algorithm.*

---

1. INTRODUCTION:

We are using SVM and HOG Algorithm form vehicle detection. HOG and SVM algorithm allowing further insights into their internal operation. After giving a brief introduction to HOG Algorithm in detail. The Second section introduces the different type of SVM **.**Along with the histogram of oriented gradients (HOG), we propose and implement a new type of feature vector, i.e., HOG symmetry vectors, in this paper. We also propose a new classification method that uses data importance in the HV step. Support vector machines constructs a hyper plane or set of hyper planes in a high- which can be used for classification, regression, or other tasks. A Support Vector Machine (SVM) performs classification by finding the hyper plane that maximizes the margin between the two classes. The vectors (cases) that define the hyper plane are the support vectors. There are two type of SVM. Linear SVM and .Non Linear SVM.

2. Car Detection with SVM the following Steps:

1. Input Image: The first step is to identify image.
2. The next step will be to cell after Zero Gradient, first order Gradient and second order gradient.
3. The next step will be to ZOD for color Features, FOG for Edge Features and SOG for Bar Features.
4. The purpose of this step is to detect and select the important data of the image and its done with SVM method.

5. After this apply Result Evaluation.
6. Last step is Test Model.

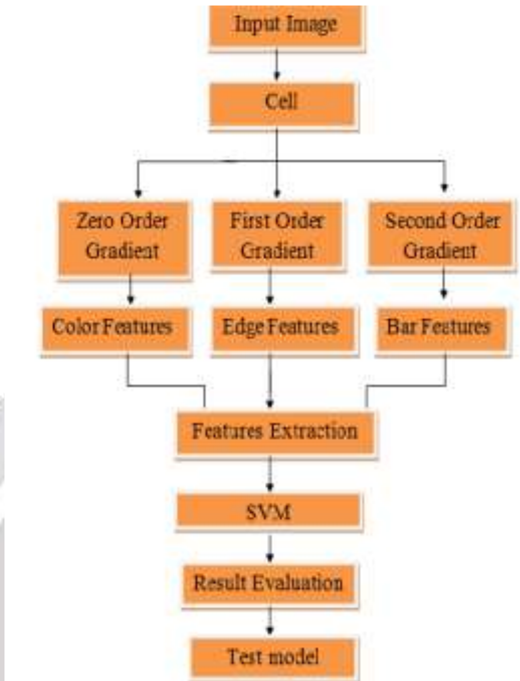

FIG:1 Car Detection with SVM Process

3. RELATED BACKGROUND:

3.1HOG Algorithm:

Histogram Oriented Gradients (HOG) is a Feature descriptor used in computer vision and image processing for the purpose of object detection . The HOG features are based on the first order gradients. The first-order gradients are related to the edge Feature. The Zero-order gradients are related to the color Feature. The Second-order gradients are related to the bar shape information. To increase accuracy of feature extraction we include zero order and second order gradient. First-order gradients:-The first-order gradients are related to the Edge Feature .The First order gradient at each pixel, aggregate the gradients to the corresponding cell, make a histogram on each cell, normalize. The histogram along four directions, and finally concatenate all the normalized histograms to get the feature vector .Zero-order gradients:- The Zero-order gradients are related to the Color Feature. RGB image is not a good representation for feature extraction, due to the mixture of pure color information and intensity information. To separate these two kinds of information, we convert RGB to Hue-Saturation-Intensity (HSI) color space. As the intensity information has already been used in HOG features (the computation of the first-order gradient), to avoid redundant information. The first-order gradient in the HOG features, respectively, and follow the entire computation process of the HOG features this can describe the distribution of color.

3.2Implementation of the HOG descriptor algorithm is as follows:

Step 1: Divide the image into small connected regions called cells, and for each cell compute a histogram of gradient directions or edge orientations for the pixels within the cell.

Step 2: Discretize each cell into angular bins according to the gradient orientation.

Step 3: Each cell's pixel contributes weighted gradient to its corresponding angular bin.

Step 4: Groups of adjacent cells are considered as spatial regions called blocks. The grouping of cells into a block is the basis for grouping and normalization of histograms.

Step 5:-Normalized group of histograms represents the block histogram. The set of these block histograms represents the descriptor.

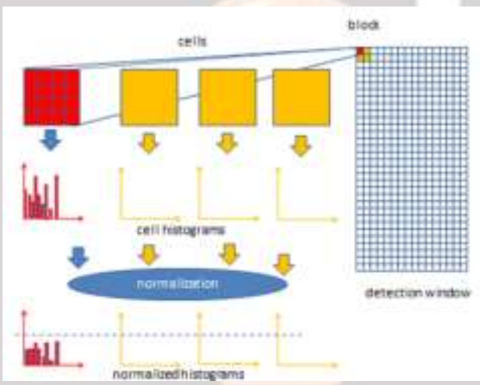

FIG:2 HOG EXAMPLE

3.3 SVM Algorithm:

In machine learning, support vector machines are supervised learning models with associated learning algorithms that analyze data used for classification and regression analysis. “Support Vector Machine” (SVM) is a supervised machine learning algorithm which can be used for both classification and regression challenges. However, it is mostly used in classification problems. In this algorithm, we plot each data item as a point in n dimensional space (where n is number of features you have) with the value of each feature Being the Value Of a particular coordinate.

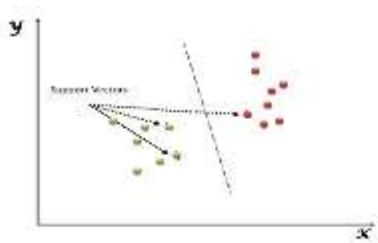

FIG 3:SVM

4. LITRETATURE SURVEY:

In this survey study,[1] Represents is research proved that even for a specific rear-view vehicle detection, we need to deal with a high dimensions of parameters and challenges to obtain a robust result. If the research supposed to approach for general vehicle detections, such as multi-direction vehicle detections, the results could have not yet been acceptable. For example, the latest achievements and state-of-the-art work listed on the KITTI benchmark website results show very low detection rates ranging from 18.4% to 74.9% for multi-view vehicle detection, even under (ideal) day-light conditions. These results are still far satisfying from needs of real-world applications or industry expectations. We also discussed bounding box inaccuracy and extremely high-computational cost of DPM, the state-of the-art object detection method proposed by Felzenszwalb .[2] Represents is the role of learning appearance patterns of an object type (vehicles) for detection and orientation estimation was studied. An extensive set of experiments demonstrated that when training rigid templates with AdaBoost, geometrical sub categorization resulted in improved detector performance. Furtherstudyofthefusionofvisualandgeometricalmodalities is left for future work .Forming clusters corresponding to occlusion levels resulted in good detection only when clusters were kept large by incorporating on-occluded samples . Learning models at multiple resolution was shown to significantly improve detection/orientation estimation performance A large drop in performance was observed when using the more strict 70% overlap evaluation threshold as opposed to the common 50% , indicating better localization is required. This could be addressed using regression approaches, as in although heavy occlusion is still the main challenge in detection. Further improvements can be made by incorporating scene information. The fast detection approach of may be used for further speedups. Finally, we would like to study application of the framework to other domains, such as hand detection.[3]Represents we have provided a review of the literature addressing on-road vehicle detection, vehicle tracking, and behaviour analysis using vision .We have place division-based vehicle detection in the context of sensor-based on-road perception and provided comparisons with complementary technologies, namely, radar and lidar. We have provided a survey of the past decade's progress in vision-based vehicle detection, for monocular and stereo-vision sensor configurations. Included in our treatment of vehicle detection is the treatment of camera placement, night time algorithms, sensor-fusion strategies, and real-time architecture .We have reviewed vehicle tracking in the context of vision-based sensing, addressing monocular applications in the image plane, and stereo-vision applications in the 3-D domain, including various filtering techniques and motion models. We have reviewed the state of the art in on-road behaviour analysis, addressing specific maneuver detection, context analysis, and long-term motion classification and prediction. Finally ,we have provided critiques ,discussion, and out looks on the direction of the field. While vision-based vehicle detection has matured significantly over the past decade, a deeper and more holistic understanding of the on-road environment will remain an active area of research in the coming years.[4]Represents vision-based vehicle detection system using TER-RM with data importance has demonstrated better performance than TER-RM without data importance. In addition, traffic hazards are reduced by applying the importance value that are caused by incorrect vehicle hypotheses extraction. The cases that parts of the vehicles are extracted as hypotheses, and the case that multiple vehicles are extracted as a hypothesis. Therefore, we expects at our vision-based vehicle detection system can be improved by vision and another sensor (such as radar) fusion for more exact hypotheses generation.[5]Represents we have proposed a solution based on Haar-like features and RBF-SVM for vehicle detection. Firstly, due to the huge pool of Haar-like features, a fast feature selection algorithm via AdaBoost has been proposed by combining a sample's feature value with its class label. Then, an improved normalization algorithm for feature values has been presented, which can effectively reduce the within-class variation and increase the between-class variability. The experimental results show that the proposed approaches not only speeded up the feature selection process but also showed superiority in vehicle classification ability compared to the state-of-the-art methods.[6] Represents a vehicle detection system that incorporates a large set of rich features capturing colour, gradient, and structural properties of vehicles and their surroundings. A Partial Least Squares analysis enables us to project points from a very high-dimensional feature space on to a low dimensional subspace. We experiment with a number of informative vectors which quantify the discriminative power of individual features. This allows us to choose a small subset of features, while discarding many noisy features. The informative vectors which produced the best results were the set of regression coefficients (B), the variable importance on projection vector (VIP), and their combination VIP-then-B. We further speed up our system by employing a multistage, multiresolution strategy to quickly reject a large fraction of image patches using a cheaper set of features and only pass on a small set of candidate patches for further analysis. We show superior performance to previous approaches on two data sets: a data set of satellite images overlooking the city of San Francisco, and OIRDS, a publicly available data set of aerial images.

5. CONCLUSION:

In this Research paper used histogram of oriented gradients algorithm for car Detection But due to some limitation of histogram of oriented gradients algorithm we can used support vector machine .we the help of HOG algorithm we can do features extraction . SVM algorithm is higher than HOG algorithm. We have completed feature extraction technique in our Dissertation used histogram of oriented gradients algorithm for car Detection But due to some limitation of histogram of oriented gradients algorithm we can used support vector machine .we the help of HOG algorithm we can do features extraction . SVM is higher than HOG algorithm

6. REFFERENCES:

[1] Mahdi Rezaei, Member IEEE, Mutsuhiro Terauchi, Member IEEE, and Reinhard Klette, Department of Computer Science, The University of Auckland, New Zealand , Department of Psychology, Hiroshima International University, Japan School of Engineering, EEE Department, Auckland University of Technology, New Zealand "Robust Vehicle Detection and Distance Estimation Under Challenging Lighting Condition" IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS, VOL. XX, NO. X, 2015.

[2] Eshed Ohn-Bar, Student Member, IEEE, and Mohan Manubhai Trivedi, Fellow, IEEE" Learning to Detect Vehicles by Clustering Appearance Patterns" IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS, 2015.

[3] Sayanan Sivaraman, Member, IEEE, and Mohan Manubhai Trivedi, Fellow, IEE," Looking at Vehicles on the Road: A Survey of Vision-Based Vehicle Detection, Tracking, and Behavior Analysis", IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS, 2013.

[4] Minkyu Cheon, Wonju Lee, Changyong Yoon, and Mignon Park, Member, IEEE," Vision-Based Vehicle Detection System With Consideration of the Detecting Location", IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS, VOL. 13, NO. 3, SEPTEMBER 2012.

[5] Xuezhi Wen, Ling Shao, Senior Member, IEEE, Wei Fang and Yu Xue," Efficient Feature Selection and Classification for Vehicle Detection", IEEE Transactions on Circuits and Systems for Video Technology, 2013.

[6] Aniruddha Kembhavi, David Harwood, Member, IEEE, and Larry S. Davis, Fellow, IEEE," Vehicle Detection Using Partial Least Squares", IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE, VOL. 33, NO. 6, JUNE 2011.