International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 04 Issue: 07 | July -2017 www.irjet.net p-ISSN: 2395-0072

VERIFICATION OF VEHICLES BASED ON IMAGES BY TREE GENERATION

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Abstract - *As accidents were increasing day-by-day, the importance of Advance Driving Assistance System came into existence to control the accidents by alerting the driver with sophisticated features. This system uses supervised classified model to classify various types of objects which will encounter in front of cars based on various constraints such as color, pose, etc. The system will be trained with a set of images with max number of all possible constraints and form the trained set as tree structure. System will capture the images which are in front of the vehicle and can identify the real-time images with predefined images and alerts the driver if there is any object which came as an obstacle for this vehicle. This paper suggests usage of Log-Gabor filters for representing the spatial frequency response of visual neurons. vehicle verification in the generated tree is done by using Support Vector Method and Random Forest Model, as opposed to existing descriptors.*

Key Words: **Log-Gabor Filters, Support Vector Machines, Random Forest Model, Hypothesis Generation, Hypothesis Verification.**

1. INTRODUCTION

Traditionally, the process of vehicle detection is done by using fixed models. After increasing in advancement of processors the same process is done in two stages. First, searching the vehicle or an object in an image based on various features is called as hypothesis generation. Second, verifying the correctness of the vehicle is called as hypothesis verification.

In Image processing filters are used to smoothen, enhance, detecting edges in an image. A Gabor filter bank is used for both for characterization of vehicles or other objects. A set of Gabor filters with different frequencies and orientations may be helpful for extracting useful features from an image. Limitation in this type of filters is that it cannot construct Gabor functions of arbitrarily wide bandwidth. To overcome this limitation, Log-Gabor filters are used. Its symmetry on the log axis results in a more effective representation of the uneven frequency content of the images.

The process of object recognition using image analysis is done by converting the pixels into collection of matrices where each pixel is depicted by using arrays. In supervised learning of image processing the mean for each row and standard deviation in converted matrix form is calculated. This is used for finding the exact output by comparing the stored values of mean and standard deviation values with respective values generated from the input image.

2. SYSTEM OVERVIEW

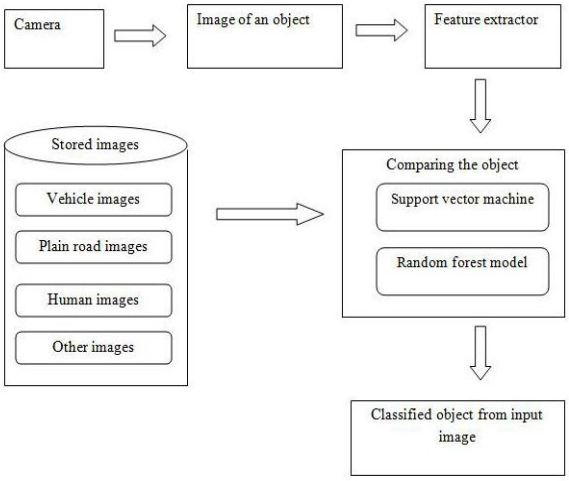

Figure 2.1: System Overview

3. ALGORITHMS

In this paper, we used two different algorithms namely Support vector algorithm and random forest algorithm.

3.1. Support Vector Algorithm:

Support vector algorithm is generated based on the concept of decision planes that define decision boundaries. A decision plane separates a set of objects having different class memberships. Most of the classification tasks are more complex structures in-order to make an optimal separation.

3.2. Random Forest Model:

A random forest consists of a collection of sample tree predictors each capable of producing a response presented with set of predictor values. In classification, this response takes the form of a class membership which classifies a set of independent predictor values with one of categories present in the dependent variable.

Random forest can flexibly incorporate missing data in predictor values. When missing data are encountered for

particular observation during model building, prediction made for that case based on preceding node in respective tree.

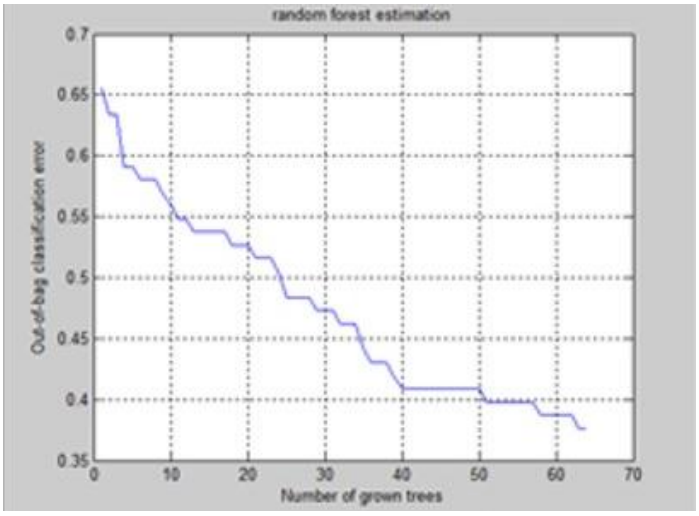

Figure 3.1: Random Forest Estimation

4. RESULT

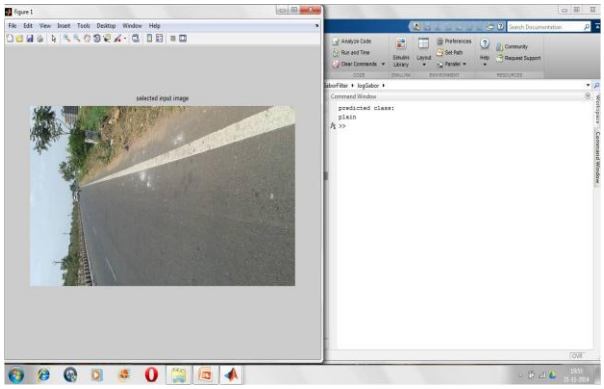

Figure 4.1: No obstacle found

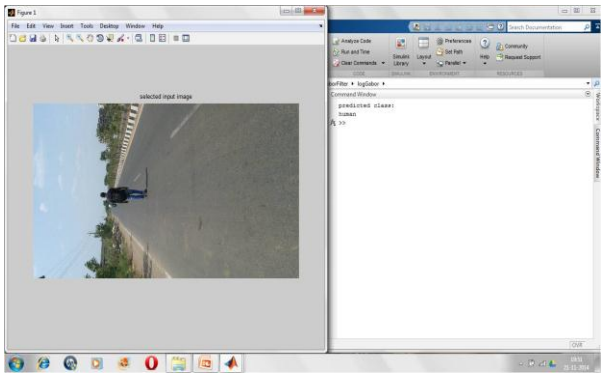

Figure 4.2: Man found as an obstacle

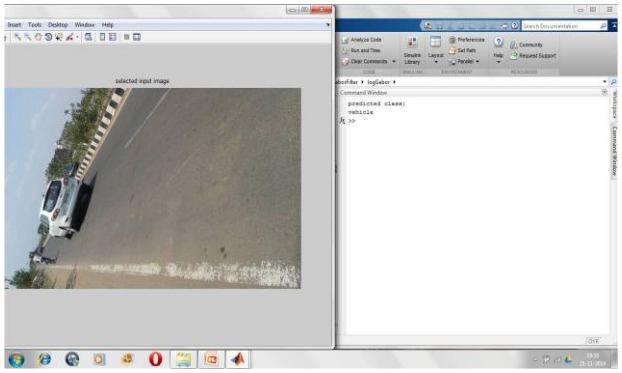

Figure 4.3: Vehicle found as an obstacle

The following figure summarizes the performance of Log-Gabor filter based vehicle verification using Random Forest Model. It is clearly visible that whenever the number of grown trees increases, the out-of-bag classification error decreases.

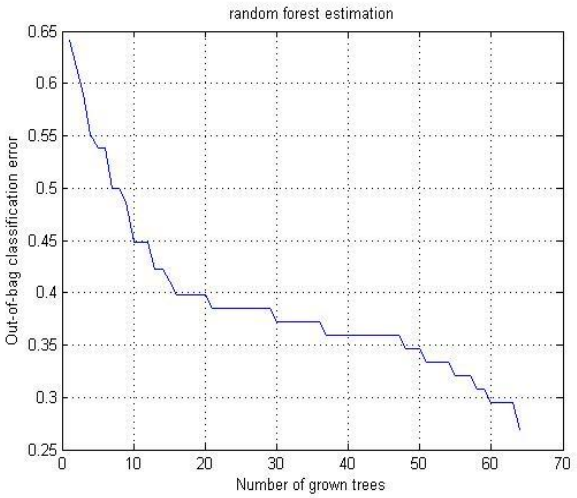

Figure 4.4: Comparison between OOB error and number of trees grown

5. CONCLUSION

Log-Gabor filter is used for comparing the object after its features are extracted from the input image and the image already stored in database to get the exact classification of object. The effectiveness and applicability of Log-Gabor filter is observed by experiments on different classes of objects. These Log-Gabor functions have better properties than traditional Gabor filters for natural image representation. Log- Gabor filters are proven to yield better results than Gabor filters using same number of filters due to their more effective coverage of spectrum and to scale better as number of filter decreases.

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