

Detection of Traffic Sign using Feature Based Method

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Abstract: *Driver assistance system (DAS) is an essential component in providing the drivers with safety measures and precaution information in traffic sign recognition (TSR). In this system we propose a novel system for the automatic detection and recognition of traffic sign. As an application of intelligent transportation system (ITS) a method is used to detect and to recognize the information contained in the traffic panels in street level images. The detection and recognition of text and symbol is applied on those images where a traffic panel has been detected, in order to automatically read the text and symbol and through the speaker the data will be announced.in this system we have used a feature based method for traffic sign detection. The images of the traffic sign board are cropped and it is matched with the original image, it will identify the key points in both the images and match between those points to find the similarity. The SURF descriptor is used for key point and matching points.*

Keywords: Feature Based method, Shape detection, SURF descriptor

1. Introduction

Traffic sign detection system is a computer vision application as its support the driver to obey the traffic rule and it provides the restriction on driver. This system is used to recognize the traffic sign and warns the driver about the sign. The shape and color of the traffic sign is standard and are defined by the government. The traffic sign boards remain unchanged in the country. The color of the traffic sign boards are black and red, the shape of the traffic sign boards may be circle or triangle. It is recorded that India has a huge number of road accidents [1] depending on their age groups. In order to stop the accidents an indications are displayed with the side of the street. The sign boards are displayed to warn the drivers in order to avoid the accidents. Unfortunately, due to lack of knowledge or due to lack of concentration about the signs boards the driver doesn't obey the rules and drives the vehicle according to its own wants and puts the driver himself in the dangerous situation. If the system is designed which will enforce the driver to follow the rules and regulation that are put by the R.T.O. it will help to reduce the road accidents.

Automatic traffic sign detection and recognition plays an important role. A method is adopted to detect the traffic panels and to recognize the information contained in the panels. Ones the information is recognize it is announced through speakers to warn the driver about the sign board.

It will reduce the driver work of recognizing and detecting the traffic sign boards and hence reduce the number of road accidents that are mainly caused by missing the sign boards. In this manner all the sign boards will be noticed.



Figure 1. Traffic sign board

It encounters various problems due to weather conditions. The weather conditions that affect the detection of traffic sign boards are due to rain, fog, less intensity of light, during night. Problems also occurs due to the damaged of traffic sign boards. A technique is used to detect and recognize the traffic signs in the real time.

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2. Related Work

Traffic sign recognition in natural environment is a challenging problem in computer vision because of the influence of weather conditions, illumination, locations, vandalism and other factors. In [2] the real utilization of intelligent vehicles. This system is divided into two phases. In the detection and coarse classification phase, by employ the Simple Vector Filter algorithm for Hough transform, color segmentation, and curve fitting approaches in shape analysis to divide traffic signs into six categories according to their shape and color properties. Refined classification phase, the Pseudo-Zernike moments features of traffic sign symbols are selected for classification by SVM. In [2] traffic sign are essential to road safety. Traffic sign plays an important role in giving the direction and for

controlling the behavior of the road user and helps to reduce the road accidents. It also provides convenience to the road users. Traffic sign provide essential information for guiding the drivers, warning them in order to reduce the road accidents so that the drivers can make their move easier, safer and in more convenient way. Traffic signs are detect by analyzes color information contained on the images, having ability of detecting and identifying of traffic signs even with bad weather condition. The system is to detect traffic signs correctly in order to alert the driver and react properly so that it can help to encountered traffic situation. We have used feature based method for traffic sign detection.

In this method the traffic sign image is captured and the captured image is cropped and matched with the original image which identifies the key points in both the images and matches with those points which find to be similar. SURF descriptor used for key points and matching of points. SURF is the most commonly used image descriptor in computational imaging. In [9] system detects candidate regions as maximally stable external regions (MSERs), which offers robustness to variations in lighting conditions. Recognition is based on a cascade of support vector machine (SVM) classifiers that were trained using histogram of oriented gradient (HOG) features. The training data are generated from synthetic template of images are freely available thus, real footage of road signs are not needed as the training data. The system is accurate at high vehicle speeds, operates under a range of weather conditions that runs at an average speed of 20 frames per second, and recognizes all classes of ideogram-based (non-text) traffic symbols from an online road sign database. In [4], it evaluate the performance of support vector machines(SVM), random forest ,k-d trees for traffic-sign classification using different-sized histogram-of-oriented-gradient (HOG) descriptors and distance transforms (DTs). It also use the Fisher's criterion and random forests for the feature selection to reduce the memory requirements and enhance the performance. The German Traffic Sign Recognition Benchmark (GTSRB) data set that contains 43 classes and more than 50 000 images.

In [5], investigate Speed Limit Sign (SLS) detection and recognition system. It is focus on North-American speed limit signs, including Canadian and U.S. signs. HOG which is used to detect and recognize speed limit sign as a set of two levels SVM based classifier. They had built there our online database called NASLS. It contains four speed limit sign which is categories as white, yellow, black and orange color sign.. To detect the speed limit sign European Union had developed an GUI as an embedded coprocessor for real time detection [8]. A forward-facing camera mounted in a vehicle to record the gray scale video which is given as an input to the system. A new technique for implementing the radial symmetry detector (RSD) efficiently uses the native rendering capabilities of a GPU. The technique maps the algorithms to the hardware such that the detection of speed-limit sign candidates is significantly accelerated.

3. Proposed Methodology

3.1 Preprocessing

The SURF (Speeded - Up Robust Features) descriptor is used for key points and matching of points .Speeded-Up Robust Features is widely used in the recent year in computational imaging. Basically, the Speeded-Up Robust Feature works only on the gray scale images. Therefore, the color image is converted into gray scale image for extracting the features.

3.2 Detecting Feature Points

First we will need to detect the key points in the images in order to match the two images i.e. the captured image and the original images. Feature based method is used in detecting the reference and the sensed graphics features. The features can be a line, a curve, an edge, a corner, etc. a pair wise corresponding features are discover for feature matching. The matching accuracy of this application will require the matching accuracy to sub pixel. Pixel is the matching unit of the feature based methods. The pair wise pixel can be used as an input regarding to sub pixel matching with other methods.

3.3 Extract Feature Descriptors

Extract feature is used in extracting the features on each key points. The feature extraction method is used to detect the two sets of features in the sensed image and in the references images. These features can be a line, a point or it can be region. Basically the feature detection mainly deals with the point features. Line intersection, road crossing, end points, corners, etc. consists the point features groups. A research work has been carried out in developing the accuracy and fast method for corner detection.

3.4 Matching Feature

To locate the object in the scene we use matching feature which includes the outlier of the matched points. To locate the object in the scene we will require to do geometric transformations. The main is to transform the reference image into the coordinate system of the target image; this is done by transforming related to the matched points, by allowing us to localize the object in the scene. This transformed image will indicate the position of the object in the scene. This transformation needed to be accurate as possible as. As the image descriptors and feature matching both are noisy processes. The descriptors are subjected to noisy images and not all the correspondences are assumed to be the true correspondences due to descriptor error in the matching.

3.5 Shape Detection

The main focus is to detect the shape of the traffic signs. Geometric shape transform calculates the transformation related to the matched points. This transformation will allow us to localize the object in the scene. Finally transform the reference image into the co-ordinate system of the target image. Then the transformed image will indicates the location of the object in the scene.

4. Conclusion

The proposed algorithm is good for detecting an object based on finding the position corresponding to the reference image and to the target images. Usually this method is suited for the objects that show non repeating texture patterns, which promote unique attribute matches. The technique works good on the uniformly colored objects or with regard to the object that will contain repeating pattern.

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