

A Review: Recognition of Automatic License Plate in Image Processing

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Abstract

In this paper a detailed study on Automated License plate recognition is given. We are proposing a strategy for actualizing Automatic License Plate Recognition utilizing Speed up vigorous element coordinating SURF system for plate identification and Advanced Radial premise work for coordinating characters. Automatic License Plate Recognition calculations by and large comprise of taking after strides for powerful preparing: - 1) Identification and location of the tag zone; 2) Segmentation of the plate characters; and 3) Optical Character Reader. Picture preparing methods, for example, sifting, edge location, Thresholding and so on are ordinarily used to play out the initial two stages of the ALPR procedure. This proposed work has been actualized by picture preparing Toolbox under the MATLAB programming.

Keywords: SURF, RBF, Neural Network, OCR, MATLAB, Segmentation, Radial Basis Function and Ransac.

1. INTRODUCTION

Computer vision techniques have led to new innovation in the automation in license plate localization. Number plate localization has been a most important and crucial part of the license plate recognition system. This procedure can tackle different

activity administration issues, for example, Highway toll accumulation, Parking administration, vehicle Theft recognition and so forth [3].

2. LITERATURE REVIEW

Character Recognition is a technique which is most widely used for authentication of person as well as document. Character Recognition is performed On-line and also Off-line. Optical Character Recognition is performed Off-line after the written work has been finished [2]. In Off-line, each character is separating by examination of character shape and looking at the components . [5]. Though, In On-line Recognition, PC perceives the character as they are drawn [2].

In Character Recognition System, firstly a database is readied which comprises of printed English letter set. At that point, the characters are filtered and pre-preparing strategy is utilized for the identification and expulsion of clamor and enhance the nature of pictures. Different techniques utilized as a part of character acknowledgment are Image Pre-preparing, Segmentation, Feature Extraction, Classification and Recognition and Pattern Matching [1,3]. Strategies utilized as a part of this are Neural Network Algorithm, Image preparing Toolbox made in MATLAB programming, SURF Feature, Ransac Algorithm and Radial Basis Function [4,6].

3. PROPOSED METHOD

A. Optical Character Recognition

Optical Character Recognition (OCR) using Neural Network is basically used in the field of research. Character acknowledgment procedure is predominantly utilized for endure the imperfections in tag, for example, tag might be tilted or bowed as for position of camera. The proposed technique comprises of essentially topological sorting strategy which incorporates the quantity of end focuses, number of openings. This approach gives the component in character acknowledgment with quality in spite of quantitative nature. Ventures of Optical Character Recognition are appeared in fig 1.

B. Steps of Optical Character Recognition



Fig 1: Steps of Optical Character Recognition [4]

1. Image Acquisition

In Image Acquisition, this approach acquires an input in the form of scanned image and also provides the location from where it is acquired. All the checked pictures which we are utilizing must be in a particular arrangement, for example, JPEG, JPG and so on. These pictures can be contribution to the framework through a reasonable info gadget, for example, scanner, computerized camera or any simple or advanced information gadget. Picture Acquisition process is appeared in fig.2 [4].

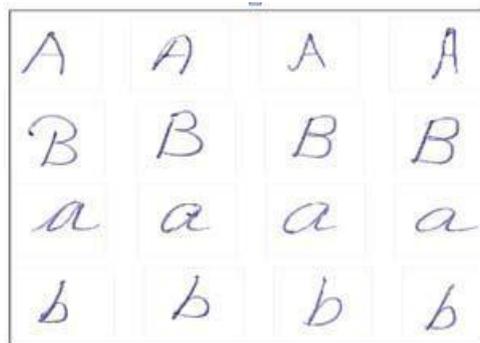


Fig 2: Sample Dataset [2]

2. Pre-Processing

The pre-processing consist a series of steps which are performed on the raw data to prepare it for another processing It fundamentally comprises of three assignments naming of associated segments, thresholding and expulsion of clamor which are performed in a consecutive way. The naming of parts chooses the valuable information from a vast accumulation of information Normally, in this approach, change is utilized to control crude information to deliver a solitary info and normalization is used to manage the data in a more suitable way so that ease to access. The process of Pre-processing is shown in fig 3. [1]

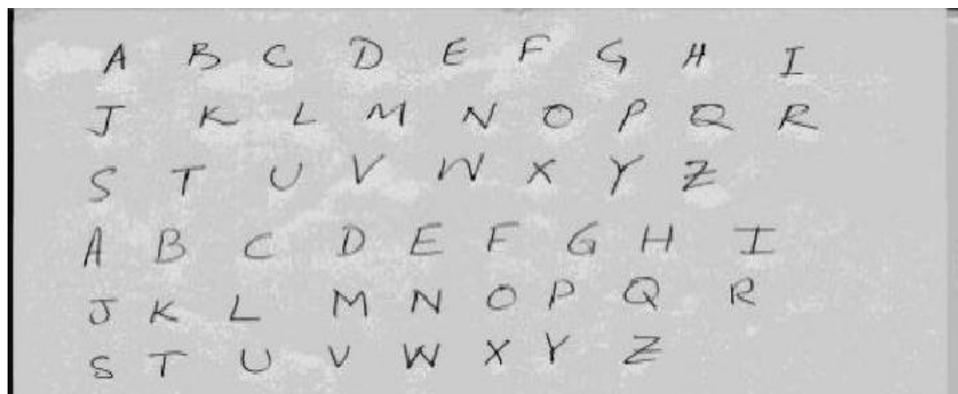


Fig 3: Gray-Scale Image [1]

- i) **RGB to Gray Conversion:** First of all the coloured image is converted into a gray colour format and the scanned image is stored in a JPEG format but we can also use the other formats of images like BMP, JPG etc for character recognition. A changed over dark scale picture bargains of number of pixels which are communicated inside a base and greatest esteem and lies between a scope of 0 to 255 where 0 demonstrates the aggregate nonattendance i.e. dark and 1 demonstrates the aggregate nearness i.e. white.
- In this process each pixel contains a single set called black and white and composed of shades of gray where black at the weakest intensity and white at the strongest. [5].
- ii) **Thresholding Approach or Binarization:** Thresholding is a procedure in which a picture comprising of Gray Scale is changed over into a picture of 0 and 1 i.e. machine meaningful shape Image utilizing a strategy named as Thresholding. This approach additionally stores a picture as line and section known as grid shape , yet in this a point comprising of pixels must be hued as either Black or White. It doles out esteem True i.e. 1 for white and False i.e. 0 for Black.
- iii) **Noise Reduction:** associated line portions can be influenced by Noise results to separation of line sections, knocks, and furthermore makes holes in lines and filled circles which are made by either examining gadget or whatever other appropriate composition approach. A procedure, named as Median channel is utilized for decreasing the commotion. By utilizing Filter procedure of Median , the estimation of a point comprising of pixels is replaces by the middle of dark levels close of that pixel [1].
- iv) **Thinning:** This approach is morphological operation handle. It is utilized as a part of paired picture to expel the closer view pixels from the filtered pictures. This procedure takes the archeological picture as an information and in the wake of playing out the diminishing procedure it gives a diminished picture of one pixel width characters. This approach should be possible by utilizing two sorts of calculations: Sequential and parallel Thinning calculations[2].
- v) **Edge Detection Approach and Erosion:** Edge recognition process is utilized to discover the limits of items inside pictures. To deliver the pre-handled picture for division, these operations are performed in the last two phases. Edge recognition comprises of essentially three stages:-
- a. Smoothing
 - b. Edge enhancement
 - c. Edge localization

3. Detection/Localisation

- i) **SURF:** For License Plate Localization, a strategy is utilized named as SURF highlight extraction. SURF technique which is utilized for highlight recognition and extraction depends on Hessian Matrix. SURF strategy is essentially reliant on the determinant of Hessian Matrix. For Hessian Matrix, we utilize a constant capacity of

two factors with the estimation of the capacity at $(x; y)$ is given by $f(x; y)$. Hessian lattice, H , is meant as the framework of fractional derivatives of the capacity f . SURF Feature Extraction strategy is appeared in fig 4. [3].

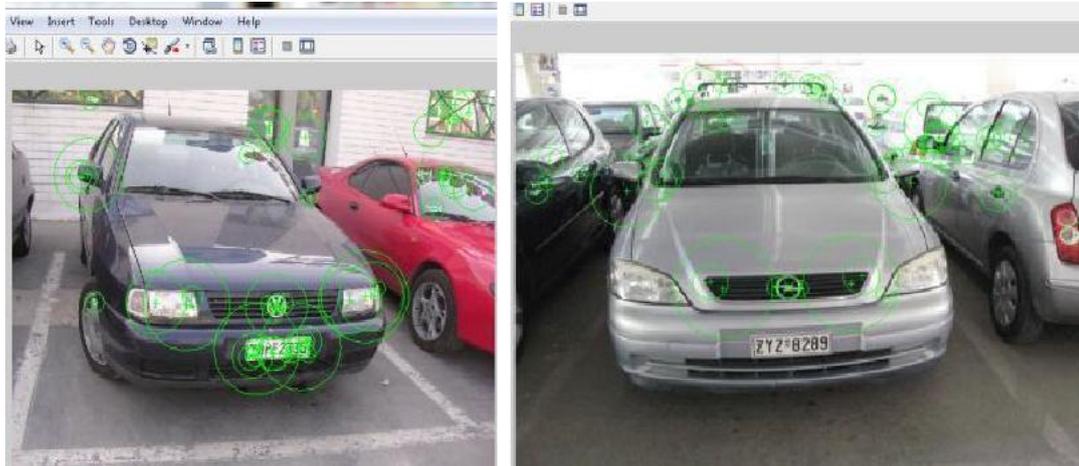


Fig 4: Matched features [3]

ii) Ransac: Ransac remains for Random Sample Consensus. Ransac calculation is utilized for discovering anomaly identification in the wake of finding the intrigue point for precise recognition. For discovering exceptions we gave parameters of inliers and anomalies in light of which we evacuated the areas that were wrongly delegated plate district.

The RANSAC calculation is comprises of essentially two stages which are performed in rehashed way, Hypothesize and Test system [3].

(a) Hypothesize: From set of information datasets negligible specimen sets (MSSs) are chosen firstly. It is a formal proclamation of relationship between at least two factors. The cases are considered utilizing just insignificant specimen sets (MSSs) which comprise of various components It gives the office of information accumulation, information investigation and information translation.[3].

(b) Testing of Framework: In the initial step, by utilizing the model parameters, RANSAC approach is utilized to check the components in dataset for evacuation of irregularity. The gathering of these components is known as Consensus set (CS). RANSAC approach will stop just when the likelihood of finding a hitter positioned ConS will be not as much as a particular esteem. The number plate with inliers components is appeared in fig 5 [3]

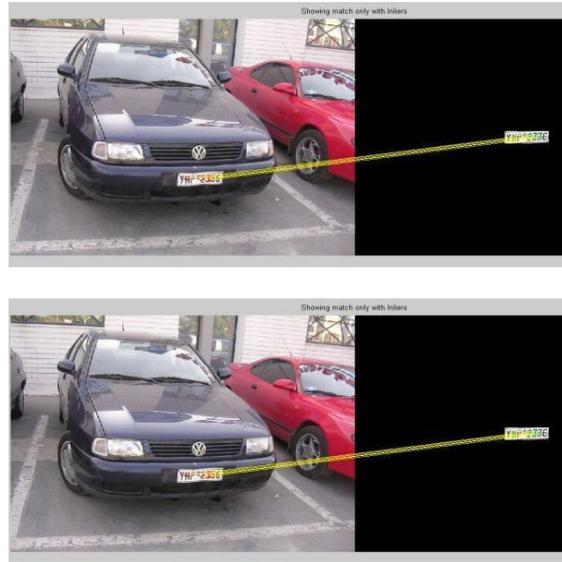


Fig 5: Located number plate with inliers features [3]

4. Segmentation

Segmentation is a procedure in which we fragment the letters in various parts and store them at some envelope. Morphological operations are utilized for division. In this expansion, close, open operations are utilized to locate the associated segments lower than a specific edge esteem and removed every one of the segments as characters. These characters are later sustained into acknowledgment module of ANN [7].

Some of the segmentation results are shown in fig: 6.



Fig 6: Segmented letters in GUI [7]

5. Pattern Matching

Design Matching comes when the division procedure is finished and each character has been separately removed. In Pattern Matching, we made a database of 26 letter sets and quantities of size 24x42 pixels utilizing Adobe Photoshop CS3. This database contains numerous examples of one character for Neural Network preparing reason. Utilizing Pattern Matching stride, the speed and exactness of general acknowledgment process expanded. Pattern Matching, RBF system is utilized. RBF system is a Radial Basis Feed Forward Propagation

Network which consist of basically three layers: Input, Hidden and Output. Basic structure of RBF is shown in fig7 [2].

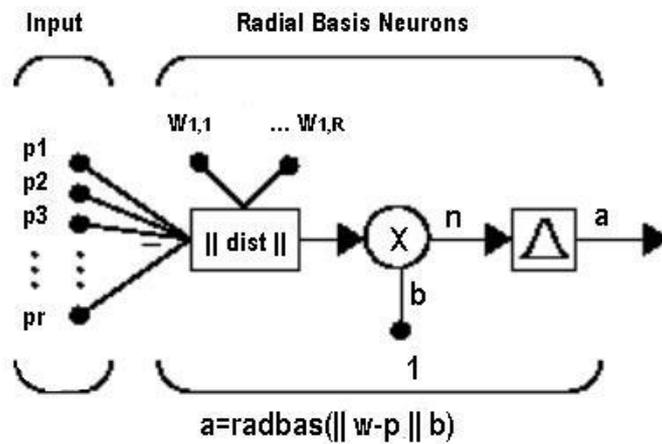


Fig 7: RBF basic structure [2]

In this figure there are various contributions from p1,p2 to pr and contribution to the outspread premise exchange function(radbas) is a vector which is utilized to demonstrate the separation between weight vector w and the info vector p, duplicated by the predisposition b. (The || dist || enclose the above fig. The outspread inclination work acknowledges p as the information vector and the single column info weight lattice, and produces the yield as a speck result of the two.) In RBF arrange, we utilize the information layer for giving the flag and afterward every one of the weights are associated with concealed layer which have relegated an esteem one and spiral premise capacity is utilized as an actuation work [2].

4. TECHNIQUES USED

NEURAL NETWORK: A Neural Network can be thought as a gathering of number of hubs which are interconnected to each other which gives a versatile neural processor. Firstly, the fundamental purpose for its higher speed is that it takes a shot at the method of parallelism; it can play out the computation at a higher rate when contrasted with the established strategies. Since a neural system gives a dynamic

situation, so it gives simplicity to changes in information and take in the elements of info flag which are given by info layer. In this system yield starting with one hub is bolstered then onto the next hub and the last yield lives on the mind boggling co-operations of all hubs. In this design yield of one hub encouraged into contribution of different hubs and follows in a successive way. The structure of Neural Network is appeared in fig 8. [2]

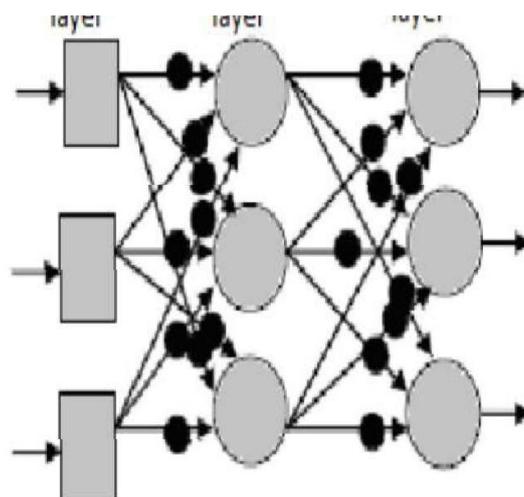


Fig 8: Neural Network [2]

Characteristics of Neural Network

- a. Training and Learning
- b. Fault Tolerant
- c. Evidential Response
- d. Adaptively
- e. Activation Function
- f. Generalization
- g. Noise Immunity

6. CONCLUSION

The fundamental point of this paper is to reproduce and analyze the aftereffects of Automatic License Plate Recognition utilizing Speed Up Robust Feature (SURF) Method for discovery of License Plate Region. In this we have additionally utilized Radial Basis Function (RBF) for character acknowledgment which is effective in perceiving characters portioned with Blurry and Noisy foundation. Every one of the investigations and reproductions have been performed with MATLAB 2011.

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