

Novel Approach for the number plate Detection in Image Processing

¹Gajendra Singh Naruka, ²Dr. Deepesh Namdev

¹Research Scholar, Gurukul Institute of Engineering and Technology, Ranpur, Kota, Rajasthan, India

²HOD cum Assistant Professor, Gurukul Institute of Engineering and Technology, Ranpur, Kota, Rajasthan, India

(¹gajendras.naruka@gmail.com, ²deepesh.girish@gmail.com)

Abstract-The image processing is the technology which can process the information which digital information stored in the form of pixels. This research work is based on the car number plate detection and recognition. To detect car number plate technique of feature extraction and classification implemented. In this research work, the morphological operation is applied with the classification for the car number plate detection. The proposed algorithm is implemented in MATLAB and results are analyzed in terms of accuracy, execution time.

Keywords-Number plate; MATLAB; Accuracy; Execution time.

I. INTRODUCTION

Image Processing is a procedure to change over an image into digital shape and perform a few operations to get an improved image and concentrate valuable information from it. It is an investigation of any calculation that takes an image as info and returns an image as yield. Image processing framework regard images as two dimensional flags and set of signs processing strategies are connected to them. It is most recent advancements and its applications in different parts of a business. Image Processing shapes center examination region inside designing and software engineering trains excessively [1]. Image processing is utilized as a part of a wide assortment of uses to enhance the visual appearance of images and to get ready images for estimation. Image processing as a rule alludes digital Image processing yet optical and analog image processing likewise are conceivable. This article is about general strategies that apply to every one of them. The obtaining of images is alluded to as imaging. Image processing is otherwise called digital image processing. Optical and analog image processing are likewise conceivable. There are distinctive sorts of image processing fields like computer graphics where images are made, image processing where manipulation and enhancement of images are to be done and computer vision where investigation of images is done [2]. Image processing is likewise characterized as the control in which input and output both are images. An image processing characterizes another image y as far as the current image x. An image can be changed in two ways. License plate

recognition (LPR) is an image-processing innovation which is utilized to perceive vehicles by their license plates. There are some futile homogeneity among various license plates, for example, its measurement and the blueprint of the license plate. LPR framework comprise of the accompanying four phases. With the assistance of sensor image is caught and digitized it with the assistance of analog to digital convertor just when image is in analog structure utilized an image securing card that believes video signs to digital images in light of some equipment based image pre-processing. License plate extraction is the most vital stage in a LPR framework [3]. This technique depends on scale shape examination, which in turn depends on the hypothesis that, characters have line-type shapes close-by and blob-type shapes all inclusive. Fit as a fiddle investigation, Gaussian filters at different parities blur the given image and bigger size shapes has rise at bigger scales. To see these scales the design of principal curvature plane is presented. By method for normalized principal curvatures, trademark focuses are separated from the scale space x-y-t. The position (x, y) demonstrates the position of the blueprint and the degree t shows the inbuilt trademark measurement of relating figures [4]. All these trademark calls attention to the hauling out of the shape from the set up image that has line-type shapes in the vicinity and blob-type shapes all around. At last the record of level and vertical line sections is aggregate and any rectangular locales orchestrating the measurements of a license plate are kept as candidate areas. The disservice of, this strategy is that it requires enormous memory and is computationally unreasonable. The central thought after region developing is to remember one or more criteria that are quality for the sought region. In the wake of setting up the criteria, the image is scanned for any pixels that satisfy the necessities. At whatever point such a pixel is experienced, its neighbors are checked, and if any of the neighbors additionally parallel the criteria, both the pixels are measured as have a place with the same region. It presents the strategies that were utilized to order and then perceive the individual characters [5]. The characterization depends on the removed components. These elements are then characterized utilizing either the statistical, syntactic or neural methodologies. The Automatic number plate recognition

(ANPR) is a mass reconnaissance strategy that utilizes optical character recognition on images to peruse the license plates on vehicles. They can utilize existing shut circuit television or street principle authorization cameras, or ones particularly designed for the errand. They are utilized by different police powers and as a strategy for electronic toll gathering on pay-per-use streets and observing movement action, for example, red light adherence in a convergence. LPR (License Plate Recognition) is an image-processing innovation used to distinguish vehicles by their license plates. This innovation is utilized as a part of different security and activity applications [6]. License plates might be twisted and/or tilted as for the camera characters separated from such license plates might be disfigured. Besides, input characters might be uproarious, broken or deficient. Character recognition procedures ought to have the capacity to endure these deformities. In this study, build up our own character recognition way to deal with suit our specific application. The proposed approach comprises of three stages: character categorization, topological sorting, and Self-Organizing (SO) recognition. In the initial step, the input character is recognized as numerical or in sequential order. This is effortlessly refined by alluding to the compositional semantics of license numbers [7]. In principle, back propagation provides a way to train networks with any number of hidden units arranged in any number of layers. In fact, the network does not have to be organized in layers - any pattern of connectivity that permits a partial ordering of the nodes from input to output is allowed. In other words, there ought to be a way to order the units such that all connections go from the input to the output. Connection pattern must not include any cycles. Networks that value this constraint are called feedforward networks; their connection pattern forms a directed acyclic graph.

II. LITERATURE REVIEW

Madhusree Mondal, et.al (2017) presented that in today's image centric world image processing has become the centre of attention for various real-life applications. [8]. Inspired by the feature learning capabilities of Convolution Neural Networks (CNN), the preeminent work is the detection and recognition of the car plate number image which is accomplished by dint of Convolution Neural Network (CNN). The number plate images can be procured by a still camera. Self synthesized feature of CNN is capable of recognizing the states of the vehicle from the number plate with a reasonably high accuracy of 90% even with very low training size. CNN has proved its robustness even with distorted, tilted and illuminated datasets.

Hussni Mubarak, et.al (2017) presented that Automatic Number Plate Recognition (ANPR) is one of the important research topics in the intelligent systems. Providing

information about the vehicle and its owner details is possible here [9]. In this paper, we review the stages and steps of action using ANPR technique of image input, pre-processing, edge setting, image splitting, and image recognition. Based on the previous studies, the researchers provide a tool to extract the numbers of electronic plates. The experiment was tested about 33 samples of Sudanese car plates, and the results show that the model can be successful with 90.06% in the extraction of plate numbers with high efficiency.

Rajshekhkar Mukherjee, et.al (2017) proposed a novel algorithm for low-level visual feature extraction highlighting non-linear morphological operations with structuring, filtering, erosion and dilation techniques [10]. The results obtained are tabulated and an accuracy of 79.30% using the above mentioned algorithm is reported. Comparison methodologies used are MSE and PSNR values and Structured Similarity Index (SSIM). The accuracy of results thus obtained are reported, suggesting the robustness and effectiveness of the algorithm. Image acquisition is accomplished by a remotely controlled android platform based device integrated with the MATLAB platform in real-time. The acquired number-plate data is transferred into a text file for creating a vehicle index log, critical for security systems.

Noprianto, et.al (2017) presented that based on experiments using few features and the result of accuracy, feature extraction is the most important step from classification to be successful. Beside feature extraction, another important lesson is preprocessing, the combination of contour extraction and vertical projection has better accuracy compared to connected component labelling in plate detection [11]. Each image taken by the camera is unavoidable from perspective distortion, so perspective correction is needed in order to get an actual-like pre processing image. Perspective correction can use Planar Homography as in this research. An important discussion about Planar Homography is actually finding 4 origin points where those points will move. The methods used to find those 4 points are Hough Transform, Vanish Point, and corner detection.

Prashanth Patil, et.al (2017) proposed system that will be designed as for the automatic vehicle identification for the security purpose. The number plate of the vehicle is identified by image identification technology [12]. The images of the vehicles will be captured by cameras and those captured images will be processed by MATLAB. A LCD screen will be provided at the entry of the gate to give the instruction to the driver and whether he is permitted to this area or not and the message will be passed to security cabin. The communication between MATLAB and microcontroller is done by using Zigbee. We can also extend to get the information of the vehicle owner, by incorporating the RTO database. The embedded section is programmed by using embedded C.

Anumol Sasi, et.al (2017) presented modifications like assigning a well-defined initial ant position and making use of weights to calculate heuristic value which will provide additional information about transition probabilities are used to overcome the limitations. Further a character extraction and segmentation algorithm which uses the concept of Kohonen neural network to identify the position and dimensions of characters is presented along with a comparison with the existing Histogram and Connected Pixels approach [13]. Finally an inductive learning based classification method is compared with the Support Vector Machine based classification method and a combined classification method which uses both inductive learning and Support Vector Machine based approach for character recognition is proposed. The proposed character recognition algorithm may be more efficient than the other two.

III. RESEARCH METHODOLOGY

The proposed research work is processed as explained in this section. Read three images which having different angle with different blur, size etc.

Then define width and height.

Then define path in which image can be take from same folder without read path of particular image.

Then use the recognized start in which clock function used for time show how it takes.

Further add path of all Matlab files in which there are two different functions which perform and then normalization is done.

Then visualization is done.

Finally the output is achieved.

In this process there is a use of angle function in which if image at different angle than we recognize easily than regions define, then lines are drawn, rectangle for number is recognized according to their length, than draw sequence sketch according to their alphabet size. Then the region is drawn according to their sketch and this shows the regions.

Acc to output LC length in which number plate than it draw red regions for easily recognize so other all parts cannot be detect or do not waste time to recognize, than its show different 2 times for LC normal methods.

Another class of locally edge distinct locators taking into account external districts, which can be adjusted by machine learning systems to discretionary shapes, is proposed. In the test set of license plate images taken from various perspectives [-45, 45], scales (from seven to several pixels tallness) even in awful brightening conditions and partial impediments, the high detection precision is accomplished (95%). At last we show the locator non specific capacities by movement signs detection.

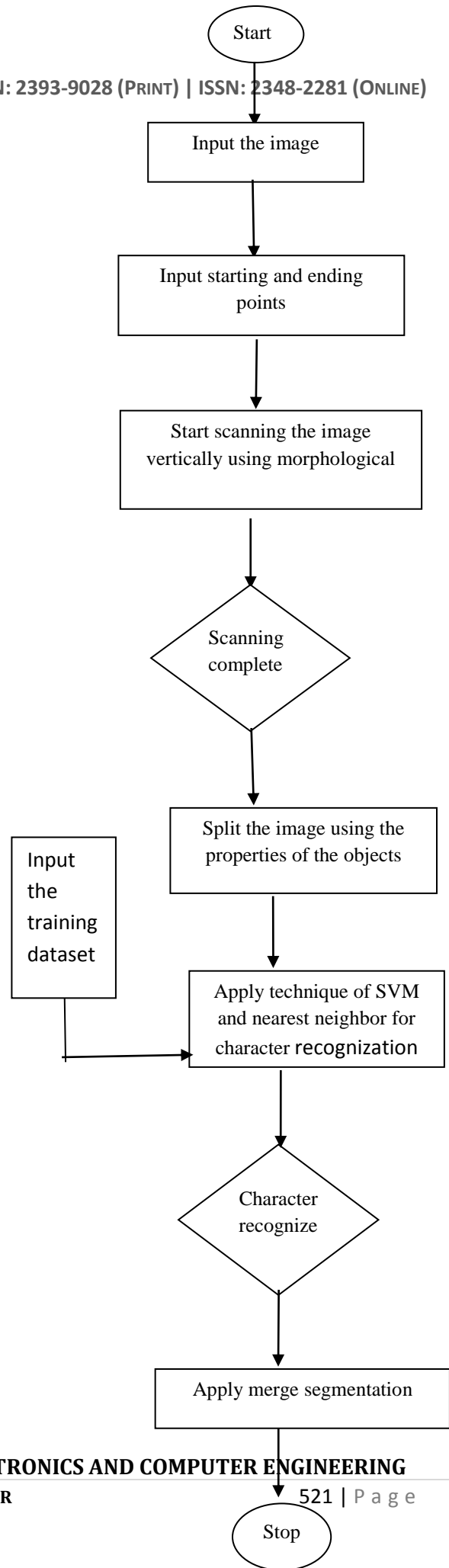


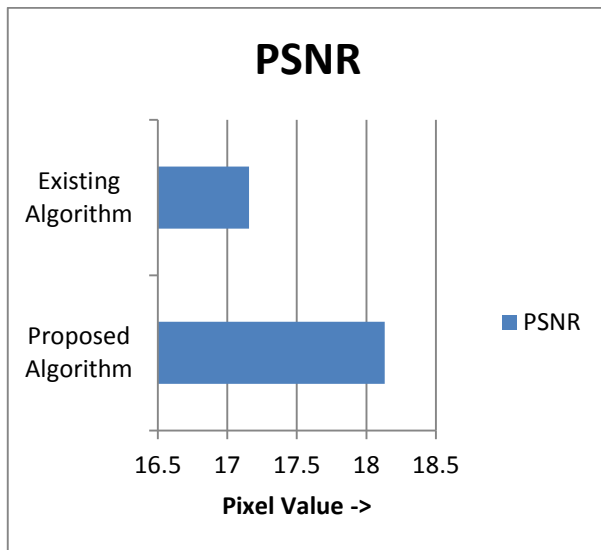
Fig.1:Proposed Flowchart

The standard classifier (neural network) inside the locator chooses a pertinent subset of external locales, i.e. areas that are associated segments of a thresholded image. Properties of external areas render the finder exceptionally robust to brightening change and partial impediments. Robustness to a perspective change is accomplished by utilizing invariant descriptors and/or by demonstrating shape varieties by the classifier.

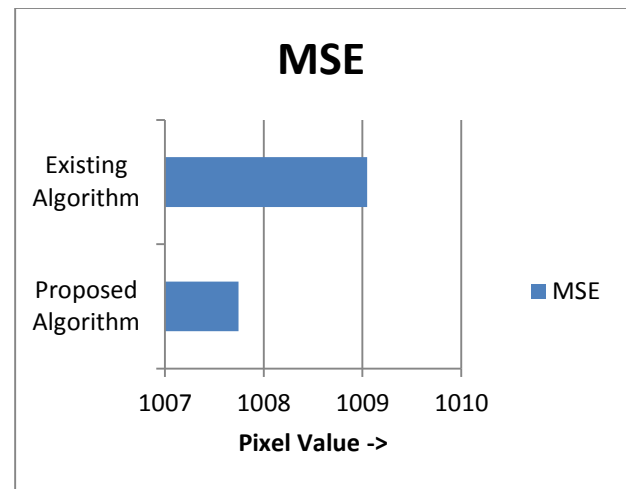
The time-multifaceted nature of the detection is approximately direct in the number of pixel and a non-streamlined execution keeps running at around 1 outline for every second for a 640x480 image on a top of the line PC.

IV. EXPERIMENTAL RESULTS

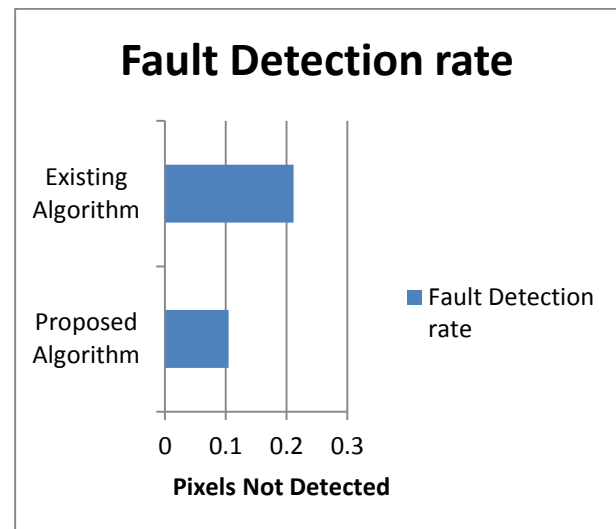
The proposed research is implemented in MATLAB and the results are evaluated by making comparisons against proposed and existing work in terms of several parameters.

*Fig .2: PSNR Comparison*

As illustrated in Figure 2, the PSNR value of proposed algorithm is more than existing algorithm due to better number plate detection in the system

*Fig. 3: MSE Comparison*

As shown in Figure 3, the MSE value of the proposed algorithm is less as compared to proposed algorithm due use of nearest neighbor algorithm for detection of number plate.

*Fig. 4: Fault Detection rate*

As illustrated in Figure 4, the fault detection rate of proposed algorithm is less due to split and merge segmentation and use of nearest neighbor classifier in the algorithm.

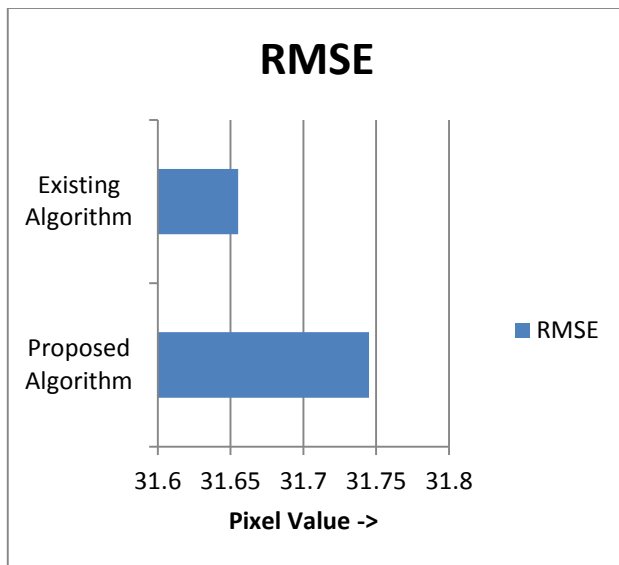


Fig.5: RMSE Comparison

As shown in Figure 5, the comparison is made between proposed and existing algorithm in terms of RMSE value. The value of RMSE is more in proposed algorithm than existing algorithm due to use of nearest neighbor classifier.

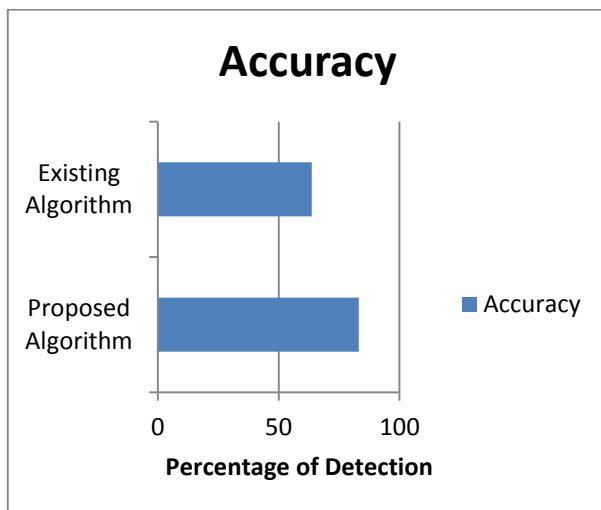


Fig.6: Accuracy Comparison

As shown in Figure 6, the accuracy of proposed and existing algorithm is compared in terms of accuracy. Due to use of nearest neighbor classifier accuracy is increased at steady rate.

V. CONCLUSION

In this work, it is concluded that number plate detection is the key challenge in the image processing. The techniques of feature extraction and classification are applied for the number plate detection. In this research work, the morphological

operation and classification techniques are applied for the number plate detection. The proposed algorithms are implemented in MATLAB and results are analyzed in terms of accuracy, execution time.

REFERENCES

- [1]. J. W. Hsieh, S. H. Yu, and Y. S. Chen, "Morphology based licenseplate detection from complex scenes. 16th International Conference on Pattern Recognition (ICPR'02), pp. 79–179, 2002
- [2]. Karsten Bems Rüdiger Dillmann Roland Hofstetter "An Application of a Backpropagation Network for the Control of a Tracking Behavior "Proceedings of the 1991 BEE Intematid Conference. on Robotics and Automatism Sacramento, California - April 1991
- [3]. Kazuki Maeno, Atsushi Shimada, and Rin-ichiro Taniguchi (2013) "Light Field Distortion Feature for Transparent Object Recognition", Computer vision foundation, IEEE explore, 2013, pp 34367
- [4]. Kazuki Maeno, Hajime Nagahara, Atsushi Shimada, and Rin-ichiro Taniguchi (2013) "Light Field Distortion Feature for Transparent Object Recognition", Computer vision foundation, IEEE explore, 2013, pp 2786-2793
- [5]. Ko, M.A.; Kim, Y.M. License Plate Surveillance System Using Weighted Template Matching. In Proceedings of the Applied Imagery Pattern Recognition Workshop, Washington, DC, USA, 15–17 October 2003; pp. 269–274.
- [6]. Krystian Mikolajczyk and Cordelia Schmid "A performance evaluation of local descriptors", Pattern Analysis and Machine Intelligence", IEEE Transactions on Pattern Analysis and Machine Intelligence , Volume 27 , Issue 10 , 2005, pp 1615 – 1630.
- [7]. Kuldeepak, Monika kaushik and Munish Vashishath (2012), "License Plate Recognition System based on Image Processing Using Labview" International Journal of Electronics Communication and Computer Technology (IJECCCT) Volume 2 Issue 4 (July 2012)
- [8]. Madhusree Mondal, Parmita Mondal, and Nilendu Saha, Paramita Chattopadhyay, "Automatic Number Plate Recognition Using CNN Based Self Synthesized Feature Learning", 2017 IEEE Calcutta Conference (CALCON)
- [9]. Hussni Mubarak, Ashraf Osman Ibrahim, Amna Elwasila and Sara Bushra, "Sudanese License Plate Identification using Automatic Number Plate Recognition", 2017, IEEE
- [10]. Rajshekhar Mukherjee, Amit Pundir, Dharmendra Mahato, Gaurav Bhandari and Geetika Jain Saxena, "A Robust Algorithm for Morphological, Spatial Image-Filtering and Character Feature Extraction and Mapping Employed for Vehicle Number Plate Recognition", 2017, IEEE
- [11]. Noprianto, Sunu Wibirama, Hanung Adi Nugroho, "Long Distance Automatic Number Plate Recognition under Perspective Distortion using Zonal Density and Support Vector Machine", 2017 3rd International Conference on Science and Technology - Computer (ICST)
- [12]. Prashanth Patil, C Kanagasabapathi, Siva S Yellampalli, "Automatic Number Plate Recognition System for Vehicle Identification", 2017 International Conference on

Electrical, Electronics, Communication, Computer and Optimization Techniques (ICEECCOT)

- [13]. Anumol Sasi, Swapnil Sharma, Dr. Alice N. Cheeran, "Automatic Car Number Plate Recognition", 2017 International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS)