

## **Licence Plate Localization And Recognition Using Mser And Swt Algorithms**

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**Abstract:** *Licence Plate Localisation and Recognition using MSER and SWT Algorithms is a very challenging area, which is in contrast to the traditional practice of monitoring the vehicles manually. License Plate Localization and Recognition(LPLR) is one of the most promising aspects of applying Digital Image Processing towards intelligent transportation system. In Location of the License plate, a method of vehicle license plate character segmentation and extraction based on improved edge detection and Mathematical morphology was presented. In the first place, color images were changed into grey images. Secondly Sobel operator is used to extract the edge of objects in image; then the MSER algorithm is applied to separate the text areas in the image .applies the dilation and erosion mathematical morphology of binary images to get the image smooth contour. The segmentation result which is sent forward to LP recognition stage will improve further processing's efficiency. Neural Network is used to recognize the license plate character*

**Keywords:** *LPLR(Licence plate Localization and Recognition ),MSER(Maximally Stable Extremal Regions),SWT(Stoke Width Transform)*

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### **I. Introduction**

License plate localization and recognition (LPLR) is one form of automatic vehicle identification system. Real time LPLR plays a major role in automatic monitoring of traffic rules and maintaining law enforcement on public roads. This area is challenging because it requires an integration of many machine vision problem solvers, which include License plate localization and character recognition . The automatic identification of vehicles by the contents of their license plates is important in private transport applications. There are many applications of such recognition systems, some of them are automatic parking fee calculation, ,border crossing control, speed limit enforcement, security, and customer identification enabling personalized services .

### **II. Licence Plate Localization And Recognition**

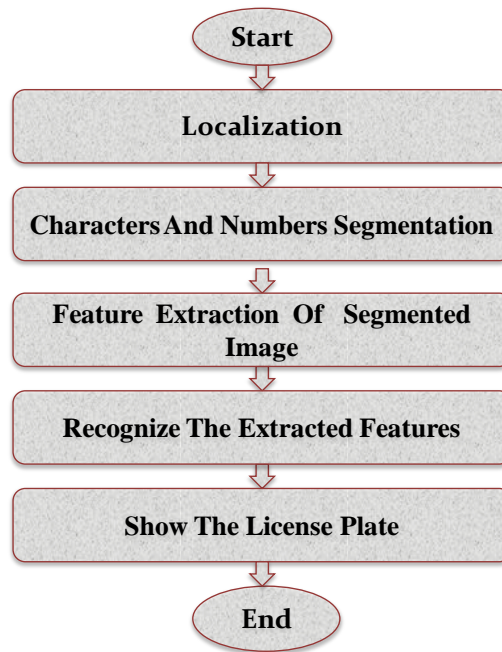
While the first industrial automatic system for License Plate Recognition (LPR) was introduced in the 80's, an outburst of commercial systems occurred in the 90s. Although that a lot of LPR systems are available in the market, the research and development still continues and new sophisticated solutions to plate localization, character segmentation and recognition appear. Vehicle's license plate recognition system has been a special area of interest in video surveillance area for more than a decade or so. With the advent of sophisticated video vehicle detection systems for traffic management applications, number plate recognition system finds wide varieties of places to fit itself beyond just controlling access to a toll collection point or parking lot [3]. It can now be integrated to the video vehicle detection systems which usually are installed in places of interest for intersection control, traffic monitoring etc., to identify vehicle that violates traffic laws or to find stolen vehicles. This paper presents a method of license plate localization and Character recognition. The whole system can be divided into three following steps:

- 1- Plate location or finding location of plate in the vehicle image and cropping plate image from it.
- 2- Plate segmentation or cutting plate image to character's images.
- 3- Character recognition or convert character's images to final distinguished characters among them.

Due to the diversity of parameters involved in car images, License plate localization is considered the most crucial stage in the whole LPLR system. In the past, a number of techniques have been proposed for locating the desired plate through visual image processing. But they were not successful in perfectly locating the license plate. Now there are some DIP algorithms for localizing the license plate, such as MSER[15] for detecting the text area from the digital image, vertical Sobel operator[ for detecting the edges ,mathematical morphological operations like dilation and erosion for the noise removal for plate

localization Now the characters on the license plate are segmented and converted into a column vector using the SWT algorithm.[16] Character recognition of the number-plate is a fairly well developed field in machine vision in which template matching and neural networks are often used and can produce satisfactory results .. However, template matching has its drawbacks in some aspects comparing with neural networks. For example, when characters of number-plate are segmented, neural network approach is preferred to template match one. The paper is organized in the following way.

### III. Block diagram

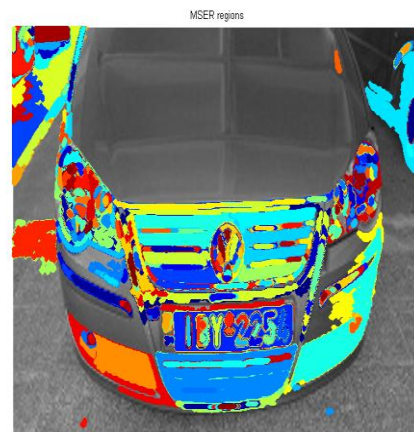
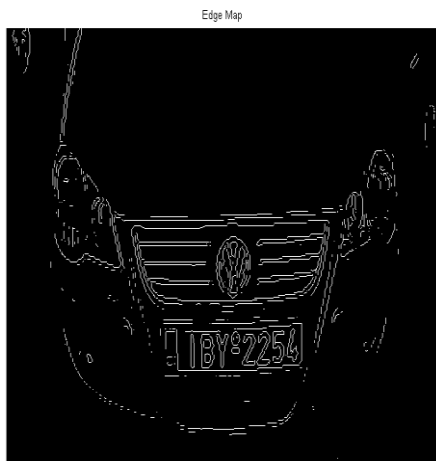


#### III.1 Localization

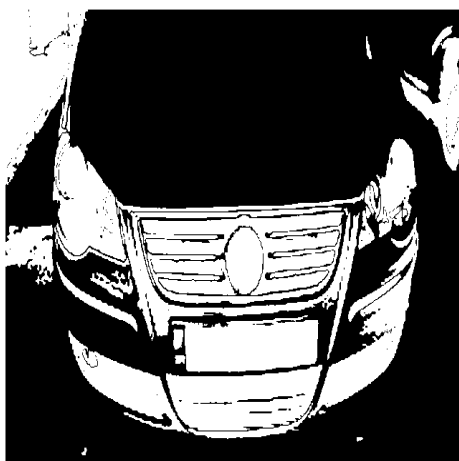
Initially the image of the vehicle is captured using a digital camera and is saved as a jpg file. Now from the image of the vehicle ,the license plate is to be located .For that the color image of the vehicle should be converted into a grey image for the easiness of processing. Now the sobel operator is used to detect the edges. Then perform the MSER algorithm[15] for detecting the text area. Now perform some morphological operations[8] like dilation and erosion for noise removal. Thus we can localize the license plate.



#### Image capturing



After applying diff., threshold values



localized no.plate

SWT



### III .2 SEGMENTATION

From the localized number plate the characters are identified by segmentation. In the case of number plate ,the letters can be of different font. So an efficient algorithm for segmenting the no plate for identifying the

characters is Stroke Width Transform(SWT) [16].Now the edge feature is extracted using CANNY Algorithm[8].Now each character feature is converted into a column vector.



Segmented characters of License plate

### **III.3 CHARACTER RECOGNITION**

The two methods are template-matching method and neural network method. Here we are evaluating neural network method. Character recognition final step in vehicle license plate detection and recognition is reading of single characters and numbers. This step is very important for example at the entrance to car-park or for the police for stolen cars search. Single elements on license plate must be segmented and analyzed. The analysis is called as Optical Character Recognition (OCR) using ANN [13].

#### **III .3.1 Artificial Neural Networks**

Artificial neural networks are statistical models of real world systems which are built by tuning a set of parameters. These parameters, known as weights, describe a model which forms a mapping from a set of given values known as inputs to an associated set of values, the outputs. The process of tuning the weights to the correct values –training- is carried out by passing a set of examples of input-output pairs through the model and adjusting the weights in order to minimize the error between the answer the network gives and the desired output. Once the weights have been set, the model is able to produce answers for input values which were not included in the training data.

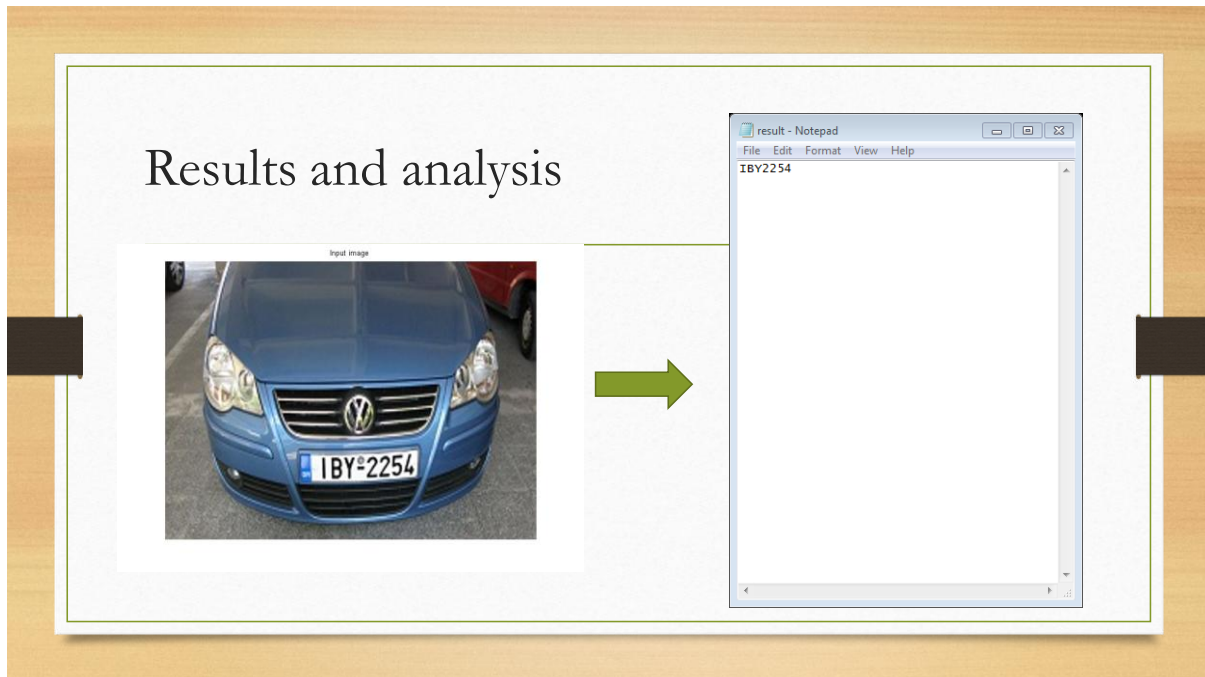
The use of artificial neural network (ANN) in OCR applications can dramatically simplify the code and improve quality of recognition while achieving good performance. Another benefit of using neural network in OCR is extensibility of the system i.e. ability to recognize more character sets than initially defined. In the character recognition algorithm using neural networks, the weights of the neural network were adjusted by training it using back propagation algorithm. In order to train the neural network, we have created different sets each containing digits from 0 to 9. This is called Block training. The complete net work was implemented as a library, which was statically tied to the project. This helped to isolate the neural network code from the rest of the preprocessing and segmentation code [14]. It also helped to reduce the memory required for the program. Character recognition of the number-plate is a fairly well developed field in computer vision in which template matching and neural networks are often used and can produce satisfactory results However, template matching has its drawbacks in some aspects comparing with neural networks. For example, when characters of number-plate are segmented, neural network approach is preferred to template match one due to more computation cost of the later method [6]. As a very powerful technique for pattern recognition problems, it is not surprising that neural networks became the basis of a number of such systems [15].

#### **III .3.2 The Back Propagation (Bp) Algorithm**

The back propagation is a widely used algorithm, and it can map non-linear processes. It is a feed forward network with the one or more hidden layers. The elementary architecture of the back propagation network has three layers. There are no constraints about the number of hidden layers. Back propagation is a systematic method for training multilayer artificial neural net works. It has a mathematical foundation that is strong if not highly practical. Using neural network has advantage from existing correlation and statistics template techniques that allow being stable to noises and some position modifications of characters on license plate. The network must memorize all the Training Data (36 characters).

#### **III.3.3 Training**

Once the network has been initialized and the training input space prepared the network is ready to be trained



If we are storing the personal information of the owner along with the license plate number, we can easily identify the owner along with the license number.

#### IV. Real Time Applications

- Some applications of this proposed system are in automated high-way toll collection systems, automation of petrol stations, journey time monitoring.
- In parking, this system can be used to calculate duration of the parking.
- For detecting traffic violation like over speed, to detect stolen vehicles and for traffic control

#### V. Conclusions

This paper introduces a neural network approach for automatic identification of vehicle License plate. Recognition of character are better with ANN than Template matching method. If the accuracy of the results is a critical factor for a vehicle number plate recognition application, then the network having many hidden layers should be used but if training time is a critical factor then the network having single hidden layer should be used. The proposed approach of license plate recognition can be implemented by police to detect speed violators, parking areas, highways, bridges or tunnels. Currently there are certain restrictions on parameters like speed of the vehicle, script on the number plate, cleanliness of number plate, quality of captured image, skew in the image which can be removed by enhancing the algorithms further.

#### REFERENCES

- [1]. Ahmad and Mohammad, 2009, "Efficient Farsi License Plate Recognition", IEEE.
- [2]. Q. GAO, et al., Aug. 2007, "License Plate Recognition Based On Prior Knowledge", Proc. IEEE Inter. Conf. Automation and Logistics Jinan, China, pp.2964-2968.
- [3]. Ahmad Radmanesh, June 2005, "A Real Time Vehicle's License Plate Recognition System", Proceedings of the IEEE Conference S.Kranthi, K.Pranathi, A.Srisaila "Automatic Number Plate Recognition (ANPR) International Journal of Advancements in Technology, ISSN 0976-4860
- [4]. Dhiraj Y. Gaikwad and Pramod B. Borole "A Review Paper on Automatic Number Plate Recognition (ANPR) System" International Journal of Innovative Research in Advanced Engineering (IJIRAE) Volume 1 Issue 1 (April 2014)
- [5]. Kumar Parasuraman, Member IEEE and Subin P.S "SVM Based License Plate Recognition System" 2010 IEEE International Conference on Computational Intelligence and Computing Research
- [6]. Ragini Bhat1, Bijender Mehandia2 "RECOGNITION OF VEHICLE NUMBER PLATE USING MATLAB" international journal of innovative research in electrical, electronics, instrumentation and control engineering Vol. 2, Issue 8, August 2014
- [7]. Warsaw University of Technology, "Automatic car number plate detection using morphological image processing Institute of Control and Industrial Electronics, EC Joint Research Centre, Institute of Environment and Sustainability
- [8]. W. K. I. L. Wanniarachchi, D. U. J. Sonnadara and M. K. Jayananda "License Plate Identification Based on Image Processing Techniques" International Conference on Industrial and Information Systems, ICIS (2007) 373 378

- [12]. Er. Kavneet Kaur<sup>1</sup> , Vijay Kumar Banga “NUMBER PLATE RECOGNITION USING OCR TECHNIQUE” IJRET: International Journal of Research in Engineering and Technology eISSN: 2319-1163 | pISSN: 2321-7308
- [13]. Allam Mousa “Canny Edge-Detection Based Vehicle Plate Recognition”, International Journal of Signal Processing, Image Processing and Pattern Recognition Vol. 5, No. 3, September, 2012
- [14]. [QADRI, M.T.](#)” AUTOMATIC NUMBER PLATE RECOGNITION SYSTEM FOR VEHICLE IDENTIFICATION USING OPTICAL CHARACTER RECOGNITION”DEPT. OF ELECTRON. ENG., SIR SYED UNIV. OF ENG. & TECHNOL., KARACHI, PAKISTAN ;
- [15]. Lviv, Ukraine 0-7803-8138-6/03/\$17.00 ©2003 IEEE “ Smart License Plate Recognition System Based on Image Processing Using Neural Network” IEEE International Workshop on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications 8-10 September 2003,
- [16]. Amninder Kaur\* Sonika Jindal Richa Jindal “License Plate Recognition Using Support Vector Machine” International Journal of Advanced Research in Computer Science and Software Engineering Volume 2, Issue 7, July 2012
- [17]. Lluís Gómez and Dimosthenis Karatzas ,Computer Vision Center “MSER-based Real-Time Text Detection and Tracking .” Computer Vision Center ,Universitat Autònoma de Barcelona. To appear in the proceedings of the 2014 International Conference on Pattern Recognition
- [18]. BorisEpshtein, EyaOfek , Yonatan Wexler “Detecting Text in Natural Scenes with Stroke Width Transform” Microsoft Corporation