

An Analytical Study & Implementation of Automatic Number Plate Recognition (ANPR) System: A Survey

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Abstract – Traffic Management of the vehicle now a days become necessary due to large number of vehicle. Besides this when something wrong happen with the vehicle many times it become difficult to recognize the number of vehicle because many time its noisy and of low illusion. This must be done carefully otherwise the reorganization of numbers present on the vehicle becomes wrong. Many author provides different methodology for the recognition of the number plates. All the author try to identified the numbers by implementing system in different languages and provides the result. In this paper we aim to provide and survey of the methodology provided by various author to recognize number plates of the vehicle efficiently.

Key Words: Automatic Number Plate Recognition, Character recognition, Template Matching, Edge Detection

1. INTRODUCTION

Vehicle Number Plate recognition carries an significant role in different applications for example traffic monitoring on highway, automatic toll fee, parking lots access control, identification of plundered vehicles etc. It was first employed in 1976 in United Kingdom at a police station. Prototype systems were introduced in 1979 and contracts were bestowed conducting commercial systems. This type of modern secured technology is now used in various restricted areas, such as parliament house, military area, Supreme Court and so on. [7]

Automatic Number plate Recognition (ANPR) systems are attracting an increasing interest because of their applicability in intelligent transportation systems that are installed in many countries for tasks like traffic enforcement and traffic monitoring. Besides, ANPR systems are also used to manage exit and entrance in vehicle parks, collect toll payments, and to manage security measures in restricted areas like military campsites, and guarded sanctuaries. Often, these ANPR systems are employed to prevent fraud and to intensify security in specific areas. as an example , they're going to be helpful when finding out missing vehicles or vehicles related to crimes. Unless for ANPR systems, this task requires an outsized amount of labour, time, and resources. Also, manual intervention in such tasks may leads to erroneous interpretations, and within the meantime, it's practically difficult for an individual's to remember or to read a license plate of a moving vehicle efficiently. Generally, an ANPR system takes an image or a video stream because the input to the system and, if the given frame contains a

vehicle it outputs the content of the license plate , usually as a text. [1]

These systems contains a camera to capture the images of the vehicles. Those images are often either colour, black and white, or infrared relying on the requirements for the system. Techniques like object detection , image processing, and pattern recognition , are used to detect and skim the license plate . Most of the ANPR systems are designed to deploy outdoors. [2]

A large enhancement in today's information technologies regarding all the fields/areas of work in present time initiated the demand for handling vehicles as theoretical means in information systems. Study of important information provided by vehicles for actuality and information purposes can be done by a person or by distinctive brainy kit which is capable to identify vehicles by their number plates in a actual world and redirect it into a theoretical means. As the number of vehicles is increasing day by day, it is a difficult task to find a car park for a huge number of scholars and professors at Scholastic Institutes or in the multi-storey buildings. A large number of car parkings are managed by hand via security guard who is not interested in keeping a record of the count of vehicles arriving and departing that parkings. [8]

However, it's challenging to detect and recognize license plates under changing environmental and weather .These factors include illumination changes, snow or fog weather conditions, and day and night. Besides, there may exist issues related to the cameras and license plate variations. For instance, dust and vibrations of the camera may end during a blurry image, which makes the recognition task problematic and produce erroneous output. Similarly, it's complex to process when there are many license plates during a given image. Our survey focuses on the following contributions.

– We explore the advantages and disadvantages of techniques and methods in both individual and holistic way, thus the ANPR system designers can make decisions on that.

– We present the performance of these selections based on accuracy, computational cost and robustness to varying environmental conditions. Further, we analyze the impact of each selection to the rest of the system in terms of accuracy and computational costs.

– We propose several requirements for an ANPR benchmark by analyzing publicly available ANPR datasets along with their current issues and available solutions.

2. LITERATURE REVIEW

SINGLE-STAGE LICENSE PLATE RECOGNITION SYSTEMS

While most of the prevailing work on car place recognition has been focused on multi-stage processes, recently there had been several successful attempts at single-stage processes. All of those attempts to the simplest of our knowledge uses a single deep neural network, which is trained for end-to-end detection, localization and recognition of the car place in a single aerial . car place recognition are often considered as a selected case in object detection. almost like single-stage object detectors these models can exploit the very fact license plate detection and recognition being highly correlated. this enables models to share parameters and have fewer parameters than a typical two-stage model would require.[2]

As a result, they will be faster and efficient than comparable two-stage method. Their approach has used VGG16, which may be a convolutional neural network model as a feature extractor. they need modified VGG16 to use only two pooling layers rather than five, as the car place encompasses a smaller area during a typical image. Then the output from the feature extractors is fed into a Region Proposal Network (RPN) . they need done modifications like the utilization of two rectangular convolution filters instead of the standard 3×3 filters. this is often to raised exploit the fact that license plates have a bigger ratio and rectangular filters perform well than square filters. Then extracted local features by these filters are concatenated to stay local and contextual information aiding in car place classification stage. an identical approach was suggested by Xu et al.. Instead of directly using an existing network like VGG16 for feature extraction, they need used a simplified Convolutional Neural Network (CNN) with 10 layers. CNN sub-network is trained to predict bounding boxes directly. The output from layers 1, 3 and 5 of the feature extractor was then fed via pooling to multiple classifiers. they need used outputs from multiple layers because each layer has different receptive field sizes. his has allowed detecting car place at a special distance to the camera. [4] The author at [6] propose an methodology which work on the study car images for number plates recognition. The task divided overall task for recognition in three parts. The first part is related to recognition of the Gray scale. The second part is related to detection of plates where segmentation of the plates carried out and plates classification was done. The third important part is related to plate recognition. This contain the Section for OCR, Feature Extraction and OCR Classification. For the analysis the different images of still cars are consider. The single camera based work with steady images can be consider as an limitation of the work.

MULTI-STAGE LICENSE PLATE RECOGNITION SYSTEMS

The existing ANPR systems are often broadly divided into two categories as multistage and single-stage methods. Most of the existing solutions for the ANPR task have considered the multi-stage method, which consists of three main steps. The first stage is that the car place detection or extraction. Existing algorithms use traditional computer vision tech-

niques and deep learning methods with object detection to locate the car place in a picture . Traditional computer vision techniques are mainly supported the features of the car place like shape, colour, symmetry, texture etc.[3] within the second stage, the car place is segmented and therefore the characters are extracted using some common techniques like mathematical morphology connected components, relaxation labelling, and vertical and horizontal projection. However, the character segmentation stage is not necessarily performed in every multi-stage ANPR system, because there are some segmentation-free algorithms in which this stage is omitted. the ultimate stage is that the recognition of the characters using pattern matching techniques or classifiers like neural networks and fuzzy classifiers. However, the most downside of separating detection from recognition is its impact on the accuracy and efficiency of the general recognition process. This happens mainly thanks to the imperfection of the detection process like flaws within the bounding box prediction. For instance, if the detection process misses a neighborhood of a license plate, it'll affect to scale back the general accuracy of the recognition process. Thus, during a multi-stage approach, it is important to realize satisfying leads to each stage.[5]

3. CONCLUSION

The Number Plate recognition system needs to manage many things like theft of vehicle, Traffic and many more This is only possible if the Number plate recognize automatically with maximum accuracy. Different author provides different ways as provided above to solve the issue but still I must say its challenging task to recognize the number plates accurately with least amount of time when multiple methods needs to embed to achieve goals.

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