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VEHICLE ALLOWANCE SYSTEM USING IMPROVED YOLO ALGORITHM

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ABSTRACT

In this era of technology, automation everything is becoming smart using technologies like artificial intelligence and machine learning. There are certain rules for every university, especially for the parking section. The basic rule is that, for those who want to park their cars in the university, they should pay fees. There are some conventional techniques to check the allowance of the vehicle, one of them is by checking manually, but this a time- consuming process and also leads to an easy chance of proxy allowance. Hence there is a requirement of developing a smart system which reduces the manual work of security guards, time and also the chance of proxy. This automated system can be achieved using a recognition system along with some suitable hardware and software. Therefore, there is a need to develop Automatic Number Plate Recognition (ANPR) system as a one of the solutions to this problem. There are numerous ANPR systems available today. These systems are based on different methodologies but still it is really challenging task as some of the factors like high speed of vehicle, non-uniform vehicle number plate, language of vehicle number and different lighting conditions can affect a lot in the overall recognition rate.[1]

INTRODUCTION

There are two conventional techniques to check the allowance of vehicles in a particular campus. One of them is by checking each and every vehicle's pass, or else checking any stickers would work, but this a time-consuming process and also leads to an easy chance of proxy. Hence there is a requirement of developing a smart system which reduces the manual work of security guards, time and also the chance of proxy attendance.

This automated system can be achieved using an object recognition system along with some suitable hardware and software. Object recognition is one of the image processing applications along with its various applications, medical field, Remote sensing, Transmission and encoding, Machine/Robot vision, Color processing,

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Pattern recognition, Video processing. Image processing is a method to perform some operations on an image, in order to get an enhanced image or to extract some useful information from it. Tesseract OCR is used for extracting text from images and documents without a text layer and outputs the document into a new searchable text file, PDF, or most other popular formats.

YOLO algorithm is an algorithm based on regression, instead of selecting the interesting part of the image, it predicts classes and bounding boxes for the whole image in one run of the Algorithm. To understand the Yolo algorithm, first we need to understand what is actually being predicted. This object detection algorithm developed will be compared with the database if the vehicle number is there in the database, then it shows whether there is access or not.

LITERATURE SURVEY:

Literature review section focus on the research previously done by several researchers.[2] Number plate recognition is the hotspot area of research now-a-days due to rapid development of transportation systems [3]. It is an image processing technology used to identify vehicles by only their license plates [4]. Number plate detection system investigates an input image to identify some local patches containing license plates. Since a plate is able to exist anywhere in an image with different sizes, it is not capable to check each pixel of the image. The advantage of this approach is success full recognition of a vehicle. Various research journals were consulted to find relevant information regarding based applications.

Massoud, Sabee, Gergais, Bakhit, "Automated new license plate Recognition in Egypt", Alexandria Engineering Journal [5]. Shapiro, Gluhchev, Dimov, "Towards a Multinational Car License Plate Recognition System", Machine Vision and Applications [6]. Zheng, He, Wu, Hintz, "Character Recognition of Car Number Plates", International Conference on Computer Vision [7]. Kim, "Learning Based Approach for License Plate Recognition, Neural Networks for Signal Processing ", IEEE Signal Processing Society Workshop [8]. Ozbay and Ergun Ercelebi, "Automatic Vehicle Identification by Plate Recognition", International Journal of Electrical, Computer, Energetic, Electronic and Communication Engineering [9]. Shapiro, Gluhchev, Dimov," Towards a Multinational Car License Plate Recognition System", Machine Vision and Applications [10].

In this research, performance analysis has to be done by using normalized cross correlation and phase correlation algorithm for vehicle number plate. The goal of the system is to recognize vehicle number plate by template matching technique using normalized cross correlations algorithm and phase correlation algorithm and to analyse the result of recognition of vehicle number plate by template matching techniques using normalized cross correlations algorithm and phase correlation algorithm. Some of the reserachers use the same work with added security features with

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help of CPABE and Quantum Key distribution standards [11-18].

DRAWBACKS OF EXISTING SYSTEM

- More Manpower
- Time Consuming
- Less Performance
- High Error Probability

EXISTING SYSTEM VS PROPOSED SYSTEM

The existing system mainly consists of humans who manually enter the data of vehicles entering into the area i.e they manually note down the vehicle numbers in a register. The problem with the existing system, the manual system is time consuming and there can be errors. The advanced technologies are too expensive to be implemented on a large scale in any organization.The proposed system eliminates the traditional task of manually maintaining the records of vehicles which are entering into the area. The security takes the image of the vehicle's number plate and it directly checks whether the number is there in the database if the vehicle's number is in the database it can enter into the area else it cannot enter. This kind of automation will be more accurate than manually noting down all the vehicle's numbers.

SYSTEM DESIGN:

1. PROPOSED SYSTEM ARCHITECTURE:

Figure 1: Proposed system architecture

This is the model of the vehicle allowance system and how it is implemented. A picture of the vehicle is taken by the security guard and then we detect that if there is any number plate in the image using YOLO algorithm and if there is an object then by using Easy OCR we perform character segmentation i.e we find the number which is on the number plate. After this we compare with the entries in the database if the number is present in the database if it is present then it shows a message saying that "YOU CAN ENTER" else it shows a message "YOU CANNOT ENTER". To extend this work the existed work having the applications related to Manets, block chain and IOT with their advanced features but failed because of lack of efficiency and more computational overhead [18-25]. They tried to extend the same techniques towards IIOT, machine learning and other related applications [26-34]

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2. PROPOSED SYSTEM FLOWCHART

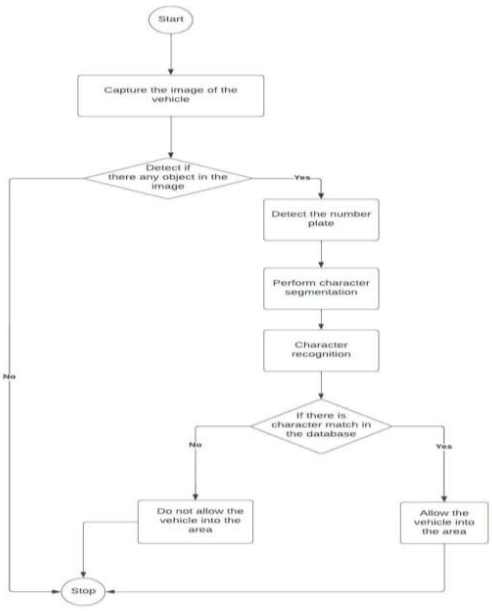

Figure2: Proposed system flowchart

METHODOLOGY:

1. REQUIREMENTS

- Any operating system that will support Easy OCR/ Tesseract OCR and Python.
- Python
- Easy OCR/ Tesseract OCR
- I3 or higher core processor (CPU)/ 2.1 GHz or higher.
- Photo images for testing

2. WHAT IS OBJECT DETECTION

In our project we are going to implement Object detection algorithm to determine if there is any object present in the image or not. The terms Object detection and Object localization have a difference. Object detection tells us about the presence of object in the image whereas Object localization tells us the presence of object in the image as well as the position of object within the image by using the bounding boxes.

3. BOUNDING BOXES

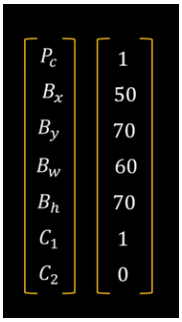

Figure3: Bounding Boxes

where;
P= Probability of a class
Bx= x-coordinate of center of bounding box
By= y-coordinate of center of bounding box
Bw= Width of the bounding box
Bh= Height of the bounding box
C1= Class1 i.e Object is present
C2= Class2 i.e Object is absent

In our project we detect that in the image has a number plate using the bounding box. The bounding box is divided into grid cells and for each grid cell we get a 7 row vector. The vector where the value of Probability of class(P) is 0 are omitted, only the Probability of class value 1 will only be considered.

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4. ALGORITHM

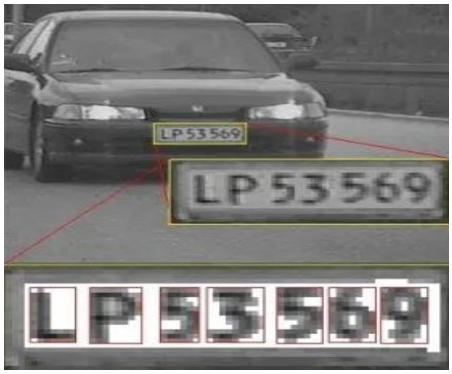

Figure4: Intersection over Union

We are implementing the YOLO algorithm in this project. YOLO algorithm is the fastest Object detection algorithm. Previously CNN, RCNN, Faster RCNN are used for object detection but in 2015 YOLO was invented and it outperformed all the previous object detection algorithms.

In all the remaining algorithms the neural network output is 0 or 1. But in YOLO algorithm it returns the neural network output as well as the bounding box. The bounding box returns the position of object in the image.

5. CHARACTER SEGMENTATION

After implementing the YOLO algorithm the number plate in the image is extracted then the next process is to segment the characters in the image and then recognize the characters.

The method of character segmentation involves locating the characters in the provided image. To extract the characters from the number plate, we are utilising character segmentation. This character segmentation is done by using easy OCR/ Tesseract OCR.

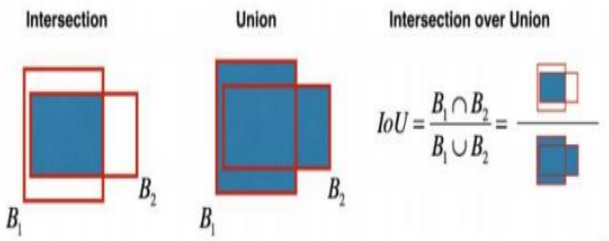

Figure5: Character Segmentation

6. BLOCK DIAGRAM

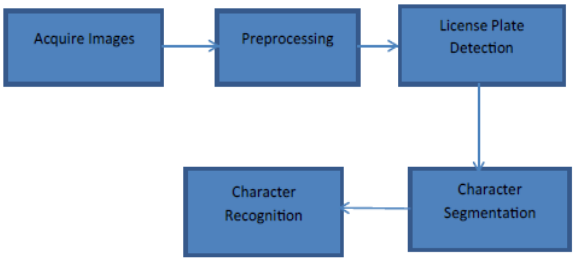

Figure6: Block Diagram

CONCLUSION

Although there are other factors that go into training a computer to perform for this vehicle allowance system, the methodologies and algorithms described in this study may be able to assist us. The biggest and most effective step to train a machine might be to use YOLO. Even though the world is moving completely towards artificial intelligence and YOLO may take some time to learn, it will increase accuracy and work more efficiently than any other algorithm at the moment. However, even in many sectors, the entry

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of a vehicle into a specific area is still manually recorded by humans. Humans could make a mistake when writing down a vehicle's number. Therefore, automating this process will be beneficial. Only registered vehicles can access the region utilizing this vehicle automation system, and if a vehicle is not authorized to enter the area, entry might be limited. The possibility of human error is relatively low if this process is automated.

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