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Automatic Number Plate Recognition

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***Abstract*—Nowadays, The population of the world crossed the 8 billion and increasing in population is proportional to the increase in vehicular traffic on roads. This all vehicles needs to park properly in parking. In big housing society's, number of vehicles comes and go. Watchmen needs to open and close the gate for every time. This needs lot of man power and needs much efforts. Automatic Number Plate Recognition is very useful in parking management. Firstly the database is created consists of details of vehicle (number of vehicle) of all vehicles of particular society. This database is connected with Automatic Number Plate Recognition system. The camera is fitted at the gate of the society. When vehicle comes, the camera captures the video of 10 to 12 seconds and convert it into image at 24 fps. This image of the vehicle is processed using Matlab, Python and various searching techniques and Algorithms of Artificial Intelligence. From this process, the number of the vehicle is extracted. This extracted number is compared with database. If the number is matches with the database, the gate opens automatically and vehicle is allowed to go in society. Also it can keep log of exit time and entry time of particular vehicle. This also increase the security, as no any vehicle other than society's vehicle are allowed to go inside. This reduce lot of efforts of watchmen and Watchmen need to check only if any guest visit the society.**

Keywords—Hybrid development, vehicular traffic, Matlab, Artificial Intelligence, Python

I. INTRODUCTION

Nowadays, the world is moving towards globalization. Globalization demanding the advancement in technologies. We need to update in technology time to time. The population of world is increasing rapidly and also the vehicular traffic on roads is increasing proportionally. For parking management of this vehicles lot of efforts are required. The fundamental purpose of putting this into practise is to make proper parking management and access control tool to reduce the efforts required for parking management. It has four working levels, it takes image of vehicle as input and then pre-process the input image using various technologies like Matlab and various python libraries, modules, and packages. Then it recognize and extract the number of vehicle. Finally it compare this number with pre-existing database and manage the access for the vehicle. If number matches the database then it give access to the vehicle to enter the particular society.

If the number of the vehicle does not matches with the database then it decline the access to enter the society.It is also useful in big parties and function, which will help to manage and maintain the disciplinary rules of the particular society. It will monitor the Entry and Exit of the vehicle which will help to know that when the vehicle is Entering and going out

II. Literature review

This paper illustrates how, in the first stage, the camera records video of12-15 secs of vehicle while entering the society which will scan the video. In the next step the video is converted into 24 fps (Frame Per Seconds). watch this video The software is MATLAB. The number plate is turned into an image in the following step, which is the most crucial stage of the project. Image processing techniques like segmentation, identification, and localization have been used to identify the vehicle number plate. Canny Edge Detection Algorithm is used to identify the edges of the vehicle's number plate. Hence, the vehicle's number plate is discovered. [1] All vehicle number plates in India follow the same general format, whether they are commercial or noncommercial cars. The District Code is listed as a series of numbers after the State Code in the General Form's first two letters.

India has a general format for Number plate of all types of vehicle may be it is , commercial or non commercial vehicles .The format of the General form , the district code appears after the state code in the first two letters as a series of numbers. , next the random series of alphabets lastly the 4 digit unique code in numericals. The Government of India recently unveiled a set of BH which means "BHARAT" which will be useful for the people who transfer the vehicle from one state to another state . When the vehicle in the General form of Number Plate was very difficult for people to transfer from One -to - Another State . Now they have made easy by Launching the New Series "BHARAT" . The Format of the Number for this new series is as follows "YY BH XXXX where YY represents the Ongoing Year , BH as BHARAT , XXXX4 digit numerical code , XX as Randomly alloted alphabets[2].

We may experience issues if the background and licence plate colours are similar. issues or errors while capturing the image of

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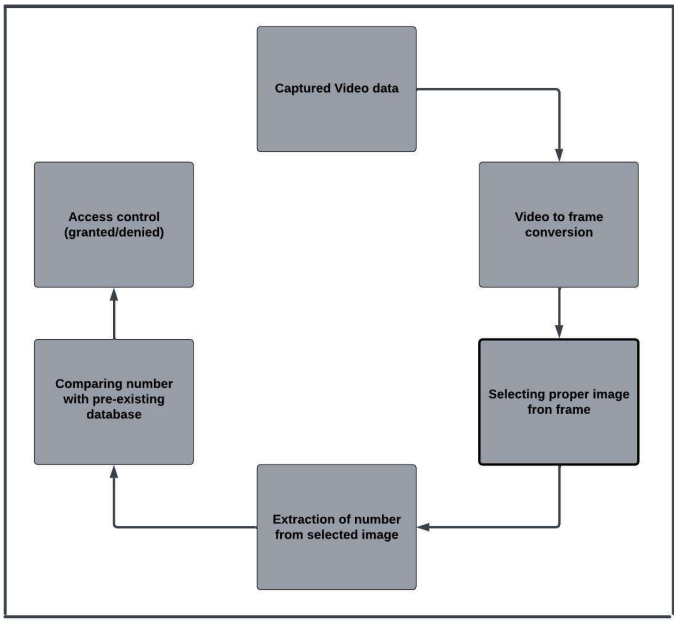
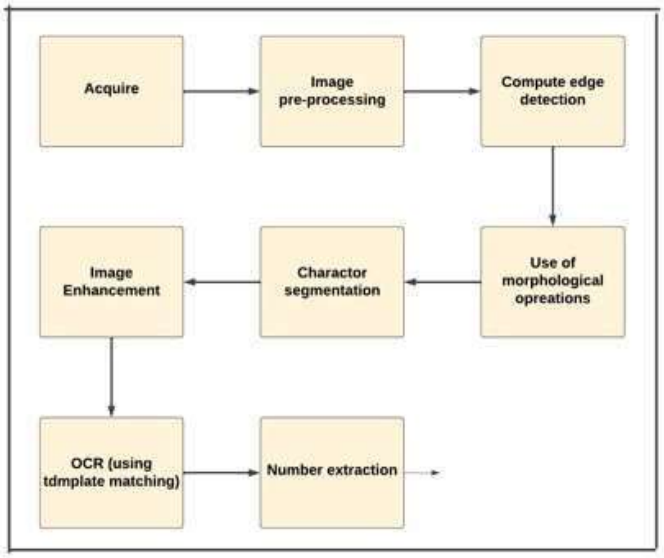
the item. There are some operations performed on images like opening and closing , erosion and dilation.The project is further divided into a number of pieces. The colourful photos were captured with a camera. Images are transformed to grey scale in the following stage. We employ a variety of filtration techniques to decrease the noise , the median filtration which removes pepper and salt noise.Histogram Equalisation is used to clear the contrast of the image.When the localisation of Number plate is carried out using Sobel Edge detection, which focuses on picture edges and regions. For the segmented licence plate, segmentation is used.[3].



Block Diagram of proposed system

Image processing and character segmentation are the technologies employed in number plate recognition. The device that should be of high resolution so that we can process a clear image of Number plate.There 4 basic steps . 1st step is capturing the video from camera for input purpose . The next step , video is changed to frames , A clear image is then chosen among them, and the processing of the plate's region is carried out utilising features like aspect ratio and edge density..To identify each number and Alphabet from the number plate Segmentation process is processed further[4].



Block Diagram of number extraction

The first method consist of pre-processing which is represent in this paper. The number of pixel is increased when we convert the colored image into the Gray image.The edges of the image are recognised using the Canny edge detector in order to lessen discontinuities. Using the morphological operator, the number is dilated to thicken it up and make it easier to detect. The procedure of segmenting dilated images is finished. It functions similarly to the amount of plates acquired separately. Segmentation is used by OCR-style algorithms for template matching. Finally, the numbers represent an approach to a better output image. To provide great output quality, the camera's resolution must be quite high.[5].

The primary goal of this paper is to use a restoration technique to detect licence plates in a variety of environmental conditions. Restoration Method is comparable to image enhancement. The quality of an image is raised by image enhancement. First of all, the system's performance is subpar. A camera that is fixed in place records a 12- to 15-second video. With the use of a Matlab process, the video is separated into frames after being captured. There are 240 frames per image in the video. After being converted to frames, video is then turned into images. For these photos, a certain technique is performed in order to extract the licence plate. Several Resolution Methods are used on the chosen licence plates. finding the number On retrieved images, plate Image Restoration and Contrast Enhancement are applied.[6].

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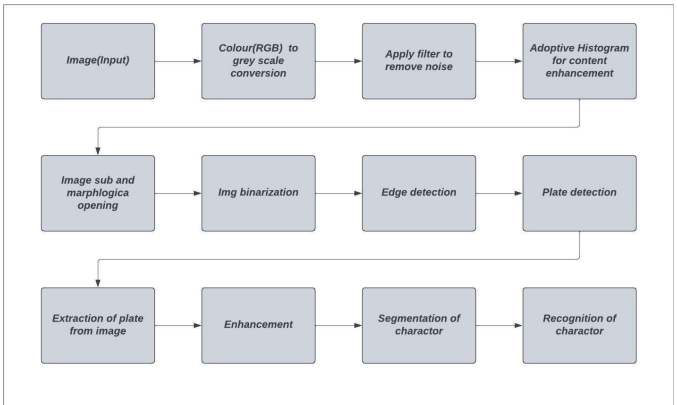
Plate edges	Detect edge of number plate
Character Analysis	To find charactor
Deskew	To transform size
OCR	Number plate recognition
Detection	To detect number plate
Binarization	To convert grey scale to binary
Post processing	To process the number
Character segmentation	To segment number

Different noises like poison noise , salt and pipper during image digitisation. BM3D(Block Machine) , Gaussian guided , Min-Max , Linear,Median,Wiener these are following filtration techniques used . As a result, we have determined that there is no particular filter that may be employed as Best one.BM3D was formed to be stable and comprehensive .Noises like salt and per and Gaussian noise can be removed by using Median Filter. To get rid of poisonous sounds It employs a linear filter. For salt and pipper noise, an adaptive fuzzy median filter performed the best.[8].

This paper is used to recognise the licence plate in both light and dark photos, but noisy, fuzzy, and low contrast images should not be used.The Flowchart of identifying the number plate in Dark , light images.This paper is fully focused on security of parking at any premises.Using Raspberry Pi and performing Matlab operations Implementation of ”ANPR” was done. First step is Image Acquisition .If the image is stable and balanced then the process of Image Acquisition is possible.It consist of Imaging System and Sensor Networking.The TSOP 1738 sensor in the Sensor Network recognises approaching vehicles and triggers the raspberry pi camera to take pictures of them. The TSOP 1738 is an IR Receiver Sensor that can pick up 38 kHz IR signals. The Sensor requires 5V and uses about 5mA to function. In order to analyse the received IR signal, the signal pin (pin 3) of the IC is often connected to a microcontroller. In further step ,the various tasks like cropping the required area, performing gray scale conversion is done by Image Processing.Some parameters get affected such as difference in color , lighter edges of object after Performing gray scale conversion. To avoid such losses dilation process is used which help to nill such losses and enhance the edges.Localisation of plate is the next step. Comparing to the processes of Localizing plates i.e. Edge Processing and Morphological Processing . At first, morphological processing was done to locate the plate, however because of the high contrast photos, that approach performed poorly.This Disadvantage was overcome by using Edge processing algorithm which it shown a drastic change in plate localizing efficiency.Using Feedforward back propogation algorithm the implementation of Neural network was followed.The system underwent testing in a dynamic environment, and results showed that automatic number plate detection, plate localization, and character detection could be completed in 1.3 seconds.[9].

monitoring and controlling college entrances in both private and public institutions to record licence plate numbers at parking gate is used by ”ANPR”.We can also use this system to identify the stolen vehicles on road. At the entrance and exit the camera system is placed at the gates.The captured images from camera are processed in computer and the database saved in the system saved the information for the Long period of time. Automatic opening and closing of parking gate can be done by the system control.High Quality cameras are required for High Quality video , images for image Processing . Also uses dustproof and Waterproof camera which also can survive under any weather conditions.Under any condition range it can process image .This system is Budget Friendly to the user .This system can identify both White list vehicles and also Black listed vehicles which are unauthorised and won’t be able to enter the society and Vice Versa[10].



Block diagram of proposed system

The system of Recognising the number plates of vehicle is an automatic representationIt employs techniques for character recognition and image processing. They are: 1. Image Acquisition - To insert an image various approaches are available in system like digital or analog cameras. 2. Extraction of the number plate area: Taking a picture of the number plate also provides the background. Thus, the next step is to identify the licence plate’s region.To determine whether the image extracted is number plate or not for the following two features are introduced are as follows. a)Aspect Ratio: The ratio of a region’s width to height is known as the aspect ratio. Application of the aforementioned features can remove the

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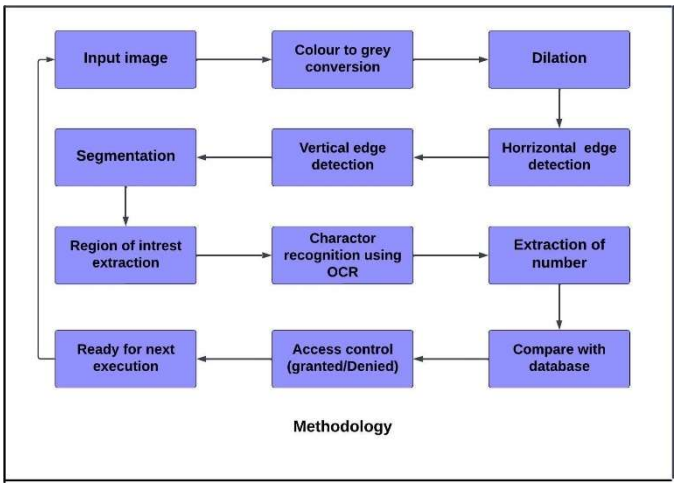
region, however certain regions still remain. b)Edge Density Hence, the local variance derived from the plate region is quantized using edge detection. 3.Character segmentation is challenging when there is image noise or poor lighting. The number plate is divided up into segments, and each number is identified. 4. Number Plate Recognition: Currently, the plate is extracted from the end image, which can then be manually compared to the input photographs.[11].

In the Following paper, Identification is done by using Raspberry Pi processor of the captured image of vehicle that there is Original and test images are unchanged. System gives alert to the computer using Alarm system when any unregistered vehicle is detected.The system receives an image of the vehicle as input, and it outputs the number plate. LINUX is the operating system in use. Open source operating system LINUX is. In order to add programmes and update codes[12].

The following points are included in this essay: 1. Realtime input: Video or images that have been captured can be used as input. A level of image processing is applied to a real-time image or video. 2:- Pre Processing:- This stage includes noise reduction , binarization, gray scale conversion. It is a most important stage in analyzing. 3:- Segmentation by ROI :- On Binary image segmentation is carried on.The Condition satisfying the start and finish positions characters make use of Horizontal scanning . 4:- Extraction:- Based on parameters and matrix value image level is extracted. Images are converted into grey images. 5:-Using neural networks, plate recognition and classification convolution. 6:Recognised Characters:- Number plate is recognised [13].



Methodology

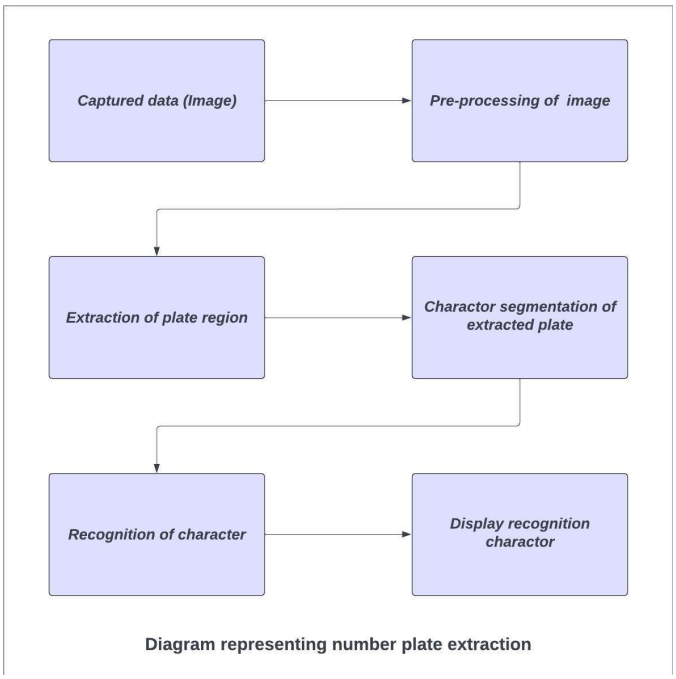


Diagram representing number plate extraction

III. Methodology

The project involves the detection of vehicle's number for using various technologies. The camera firstly click the video of moving vehicle of duration of 10 to 12 sec. This video is then converted to 24 fps. Using sorting technology, from the frames one clear image is selected. Then selected image is converted into grey colour code and dilated. Then horizontal and vertical edge detection id done using Soble edge detection algorithm. Then segmentation id done to reduce the pixels.

Using OCR technology, the characters are recognized and the number is extracted. The extracted number is then compared with the pre-existing database. Then the system give access if number matches with database. If number does not match then is does not give access and manual checking is required.

IV. Acknowledgment

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V. Conclusion

Every industry in the current era employs the most recent technologies. After a pandemic, it is crucial to stay on top of technological developments.Traffic and parking management system is not expected from this. Due to increasing in vehicular traffic, parking management has high demand. So we are studied on Automatic Number Plate Detection using Hybrid Development. In big housing society, thousands of vehicles come and go through the main gate of society, so watchmen on gate needs lot of efforts to open and close the gate. ANPR make it simple and reduce efforts by scanning number and open gate automatically.

VI. References

[1] G. Eason, B. Noble, and I. N. Sneddon, “On certain integrals of LipschitzHankel type involving products of Bessel functions,” Phil. Trans. Roy. Soc. London, vol. A247, pp. 529–551, April 1955.

[2] J. Clerk Maxwell, A Treatise on Electricity and Magnetism, 3rd ed., vol. 2. Oxford: Clarendon, 1892, pp.68–73.

[3] I. S. Jacobs and C. P. Bean, “Fine particles, thin films and exchange anisotropy,” in Magnetism, vol. III, G. T. Rado and H. Suhl, Eds. New York: Academic, 1963, pp. 271–350.

[4] K. Elissa, “Title of paper if known,” unpublished. [5] R. Nicole, “Title of paper with only first word capitalized,” J. Name Stand. Abbrev., in press.

[6] Y. Yorozu, M. Hirano, K. Oka, and Y. Tagawa, “Electron spectroscopy studies on magneto-optical media and plastic substrate interface,” IEEE Transl. J. Magn. Japan, vol. 2, pp. 740–741, August 1987 [Digests 9th Annual Conf. Magnetics Japan, p. 301, 1982].

[7] M. Young, The Technical Writer’s Handbook. Mill Valley, CA: University Science, 1989.

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