

# Indian Vehicle Number Plate Image Recognition having Salt and Pepper Noise using Median Filter and Region Props Algorithm

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## ABSTRACT

Controlling Traffic is challenging issue in most of the developed and developing countries. The Traffic Control system should be smooth to save time, decrease pollution and easy access to reach at emergency services from road if there will be any requirement. Automatic Number plate Recognition is one of the methods which not only improve traffic problem but also help to locate stolen vehicles and search person whose are not obeying traffic rules from Number plate of vehicle. There are many analyses done to detect the registration number of vehicle. But in this work, Registration Number is detected from Number Plate image captured from Video and algorithm is capable to identify whether the number is even or odd along with name of state. The complete information is saved in text file. The Registration plates are captured by using the video cameras installed at different locations for controlling traffic. After that 22% salt and pepper noise is added to original image. Then applying many filters and morphological operations to remove noise from image. The Region props algorithm is used to extract the alphanumeric characters from image. The accuracy rate is 95% at 22% of salt and pepper noise present in image. The Complete work is done in MATLAB R2015, Image Processing Tool Box and Graphical User Interface.

**Keywords:** - Number Plate Recognitions, Morphological, Salt & Pepper, Spackle noise, Region Props algorithm

## I. INTRODUCTION

The number of vehicles in our country increases day by day. Which causes increase in crimes, traffic on roads, traffic laws violations, hit and run cases and heavy rush on toll plazas installed at various places for toll tax collection[2]. Traffic police can't solve all the crime cases because police is unable to detect the vehicle involved in crime. To detect the vehicle accurately, police should have a good automatic vehicle recognition system. The major problem in accurate number plate recognition is bad quality of vehicle image captured by CCTV cameras. Due to bad weather conditions such as fog and rain, bad light effects, different fonts and background colors of number plates, the image got noise. Due to noisy image, the characters can't be recognized accurately. The proposed works on different types of image noises such as Salt & Pepper and Spackle noise.[3]. This number plate recognition system can also be used for traffic management, online parking management, automatic toll collection and congestion control[2]. When number plate is detected accurately, police or toll authority can easily get information about the owner of vehicle. The Indian number plate has ten characters. First two letters gives the state information, next two digits gives the district information, next two letters are optional and last four numbers are the unique registration number of vehicle[2]. For example number is CG11ME1111.

CG	11	ME	1111
State code	District code	Optional	Unique License Plate number

Table 1: Description of Indian number plate

This paper includes five sections. First section includes Introduction about number plate recognition system and its uses. Second section includes the noises and filters used to remove noises. Third section includes implementation. Forth sections includes conclusion and future scope Fifth sections includes references.

## II. NOISES AND FILTERS

The types of noises on which this work has been performed

### A. Salt and Pepper noise

This is also called impulse noise, shot noise, or binary noise. This degradation can be caused by sharp, sudden disturbances in the image signal; its appearance is randomly scattered white or black (or both) pixels over the image[10].

### B. Spackle noise

Gaussian noise can be modelled by random values added to an image; speckle noise (or more simply just speckle) can be modelled by random values multiplied by pixel values, hence it is also called multiplicative noise. Speckle noise is a major problem in some radar applications[11].

### C. Median Filter

This filter consider each pixel in the image. Sort the neighbouring pixels into ascending order based upon their intensities values. Replace the original value of the pixel with the middle value from

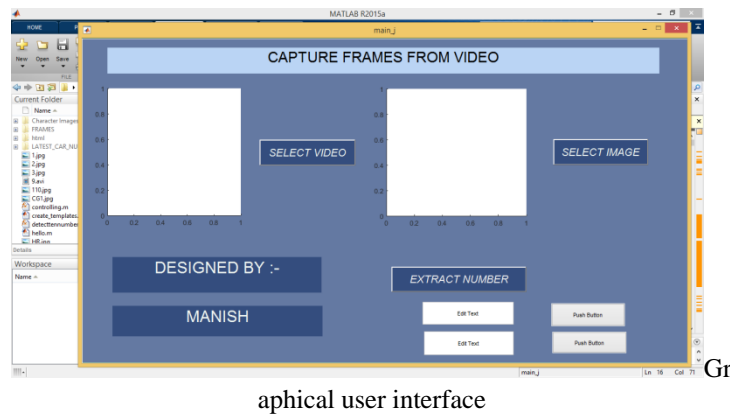
the sorted list. This filter is slower because sorting of intensities of each pixel is time consuming process even by using quick sort algorithm[11].

### III. IMPLEMENTATION

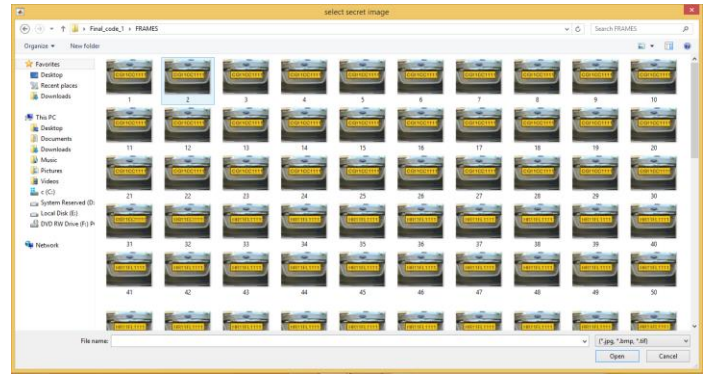
Implementation follows following steps:-

1. GUI created
2. Video captured by CCTV is selected
3. Video converted into frames of images
4. One image frame is selected as input image
5. Image converted to gray scale image
6. 22% Salt and Pepper noise added to image
7. Filtered the image by median filter
8. Erosion and dilation is performed on image
9. Character segmentation by **Region Prop Algo**
10. Optical character recognition by template matching
11. Even/ Odd and State name detected
12. Number, Even/Odd and state name as output stored in notepad file

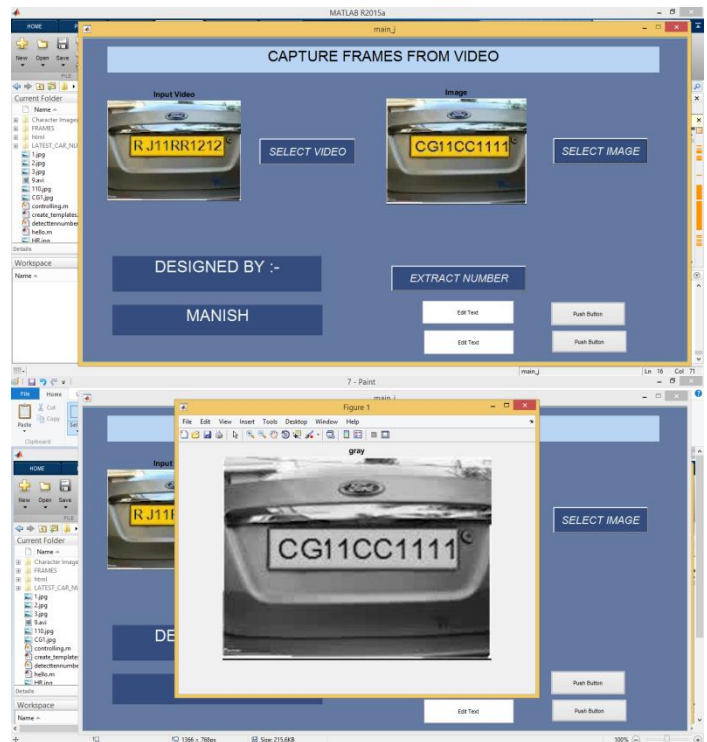
Screen shots of results are as following:-



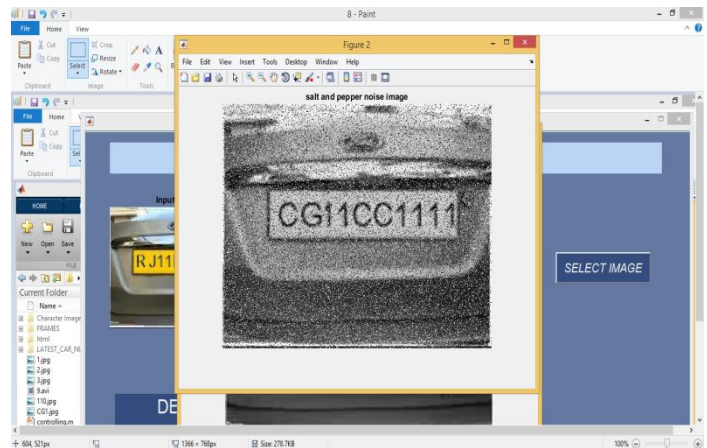
Graphical user interface



Video converted to frames of images

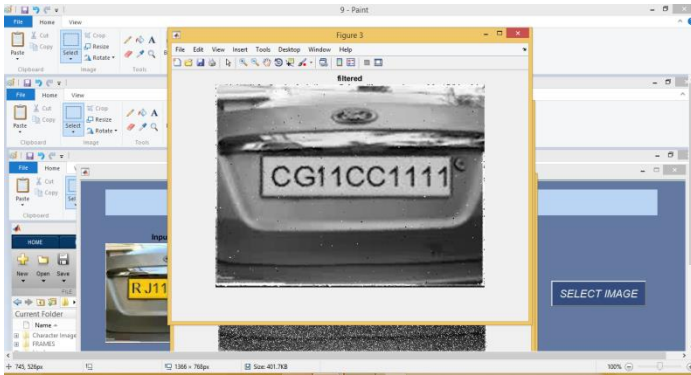


Gray scale image

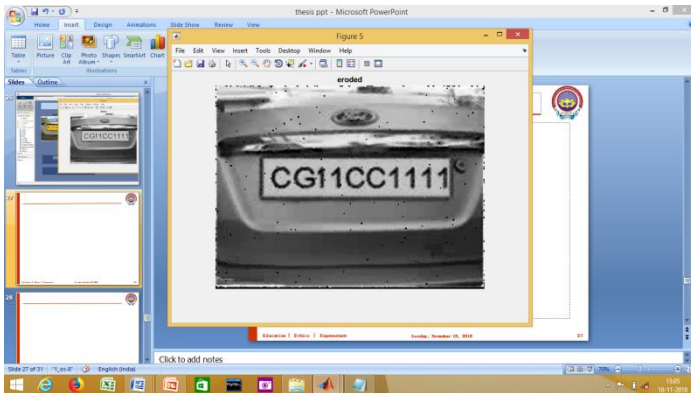


22% Salt and Pepper noise added

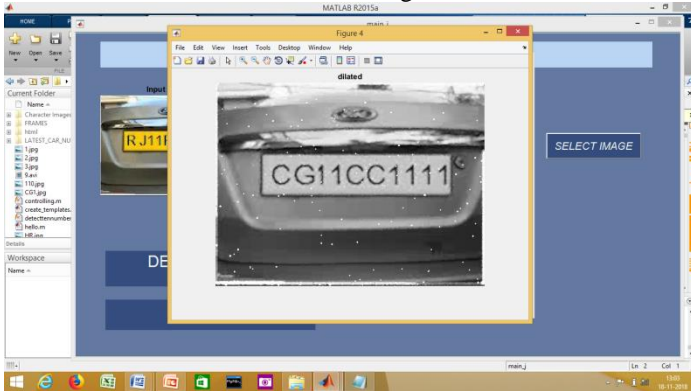
Output in .txt file



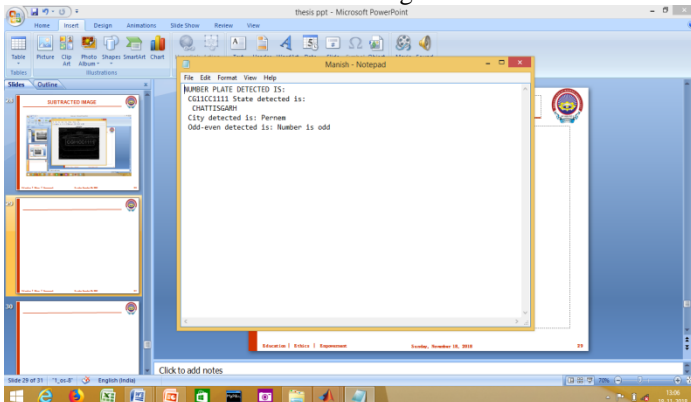
Filtered image



Dilated image



Eroded image



Results table

	Existing Method	Proposed Method
<b>No. of images taken for experiment</b>	30	30
<b>Noise added</b>	Salt and Pepper	Salt and Pepper
<b>% of noise added</b>	20%	22%
<b>Number palates correctly recognised</b>	25	28
<b>Accuracy</b>	85%	95%

## IV. CONCLUSION AND FUTURE SCOPE

In existing method salt and pepper noise is added up to 20% in original image and detect 25 images correctly out of 30 images taken. The accuracy achieved by existing method is 85%. In proposed method we have worked on two different noises which are salt and pepper and spackle noise with 22% noise added to original image. In proposed method 28 images are detected correctly out 30. The accuracy achieved is 95% which is more than existing method.

In proposed method we also detect the state of vehicle and even/odd status of number. In further enhancement to this work it can be implemented on original blurred images rather than adding noise manually. In this we can also work at some other noises such as Gaussian noise and poison noise etc. In future we can also work on higher level of noises such as more than 22%.

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