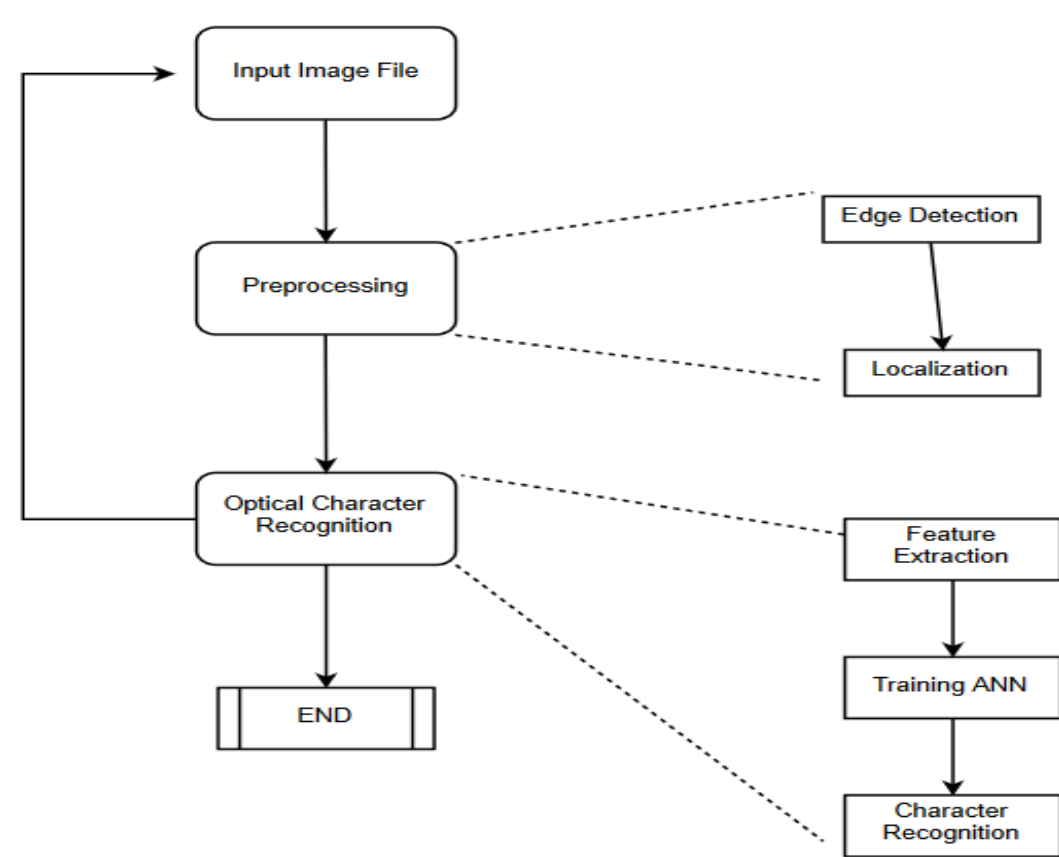


# Automatic Number Plate Recognition

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## 1. Introduction

Automatic Number Plate Recognition using Image Processing and OCR.  
ANN was used and exploration of CNNs.

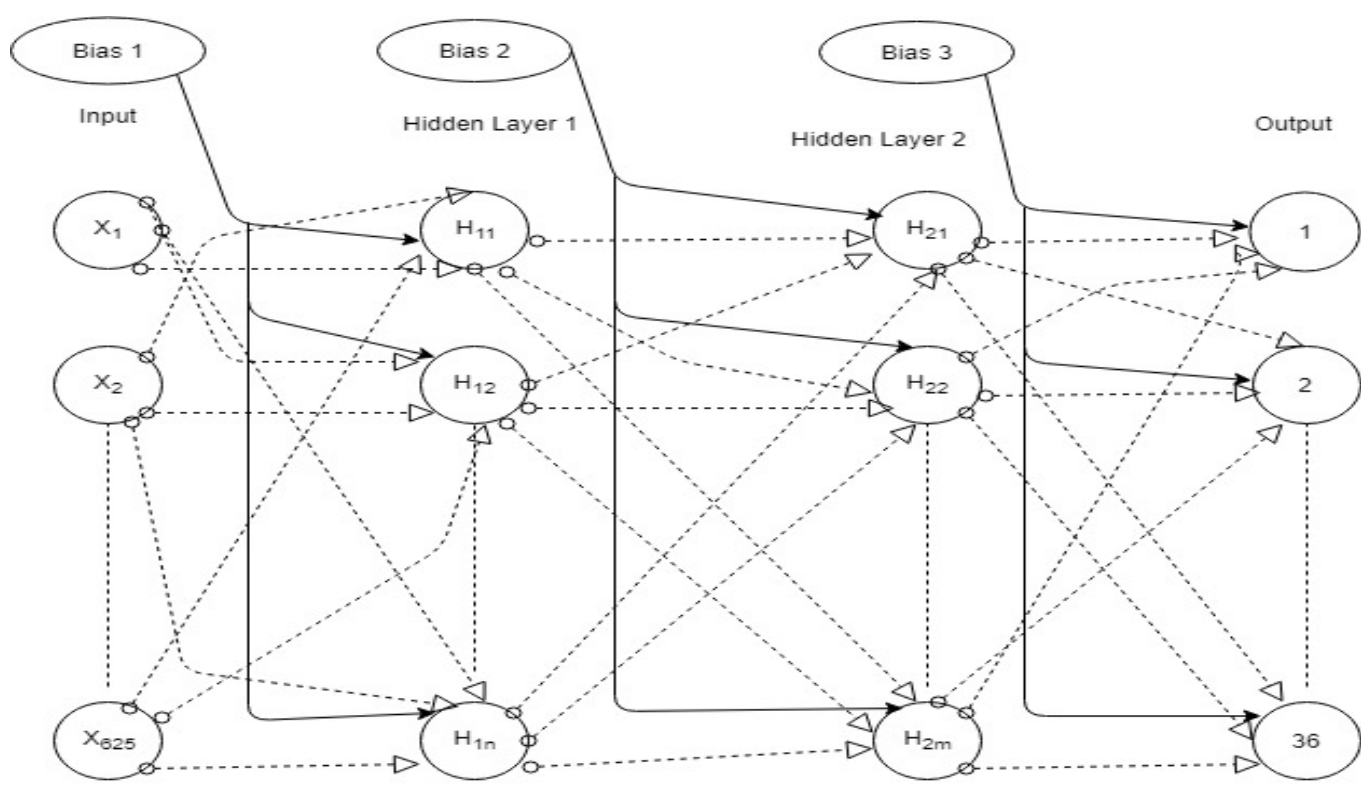


## 2. Data description

The dataset consists of images of individual alphanumeric characters. The test images consist of images of cars, with the number plate clearly visible and has minimum reflection.

## 3. Technical Details

The implementation is done in Python 2.7.  
Division of the project is done into 2 modules:  
1.Preprocessing of the image.  
-Conversion of image to gray scale.  
-Edge detection  
-Segmentation  
2.Optical Character Recognition using ANN.



## 4. Results

The accuracy of each of the modules highly depends on a number of factors, also the performance of ANN is directly proportional to the quality of the segmented images.

The results generated from rigorous testing are as follows:

	Accuracy
Plate Localization	78.9%
Character Segmentation	60%
OCR from the segmented characters	55.66%

## 5. Parameter choices

- Batch size = 16,
- Learning rate = 0.01,
- Network architecture = 2 Hidden layers (400, 300) nodes
- Activation function = Sigmoid/ Relu/ Tanh
- Optimization algorithm: Adam/ Gradient Descent

These choices were used as they have proved to be successful in all neural network implementations.

## 6. Conclusions

Neural Networks perform better for image classifications compared to other classification algorithms.

Adam optimization converges faster than gradient descent.

## 7. References

Bhavin V. Kakani, Divyang Gandhi, Sagar Jani, “Improved OCR based Automatic Vehicle Number Plate Recognition using features trained Neural Network.” IEEE-40222, ICCCNT 2017