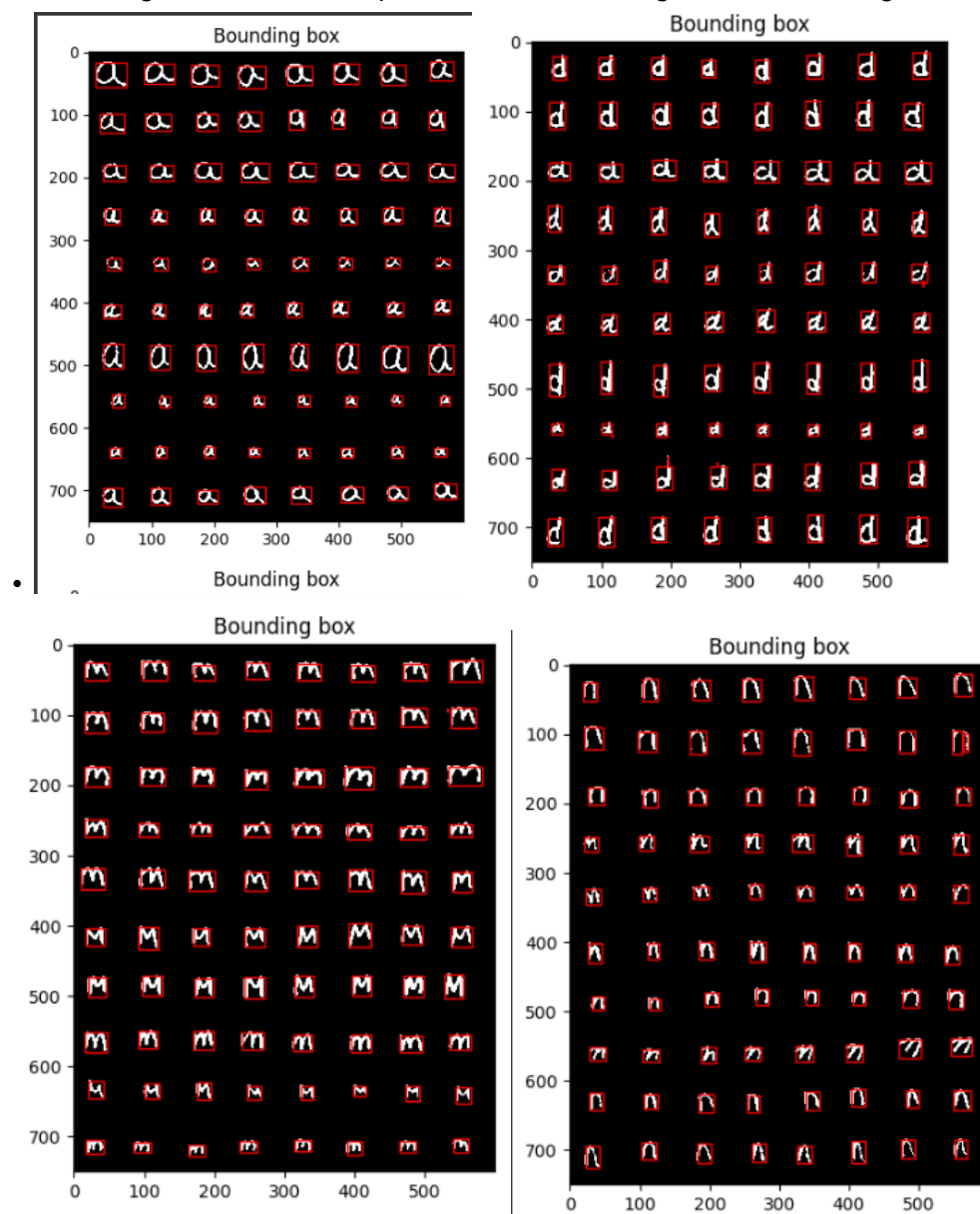
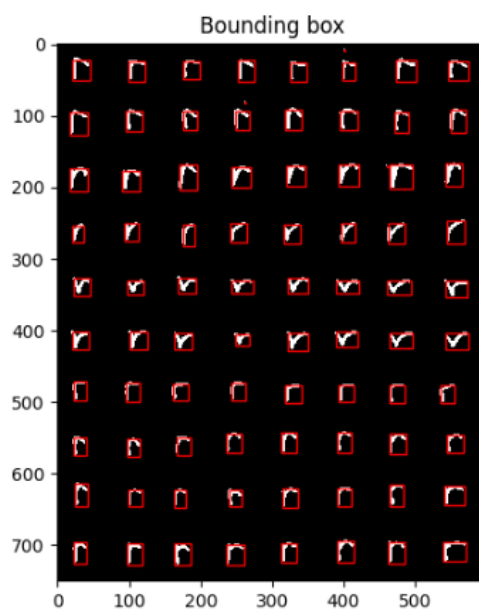
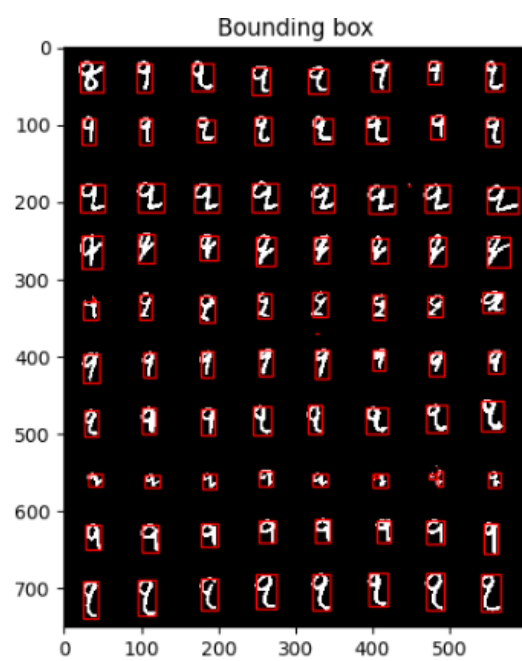
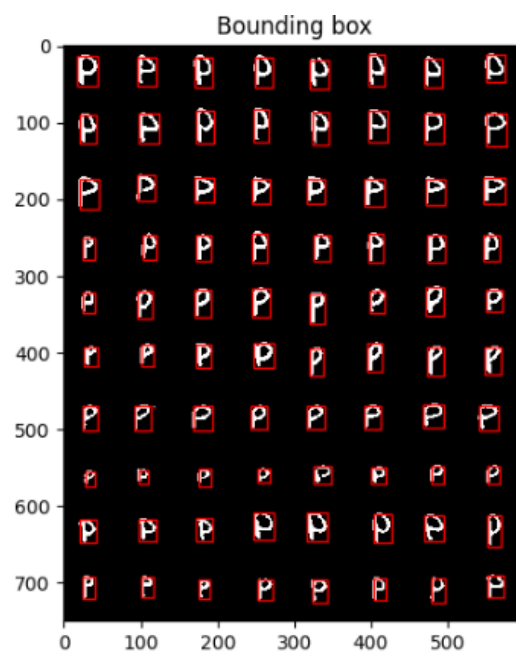
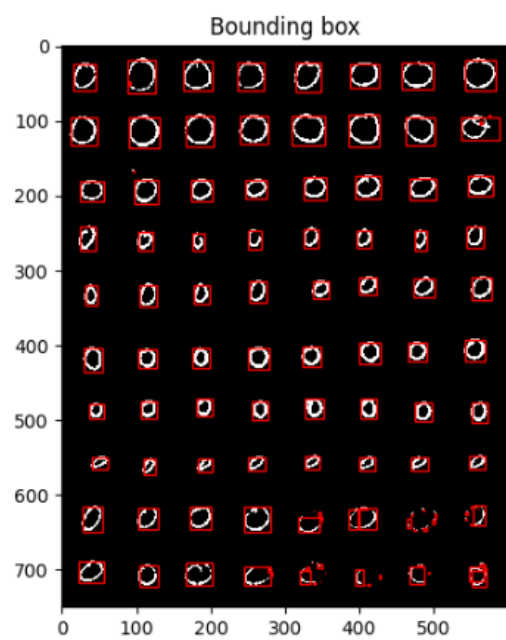
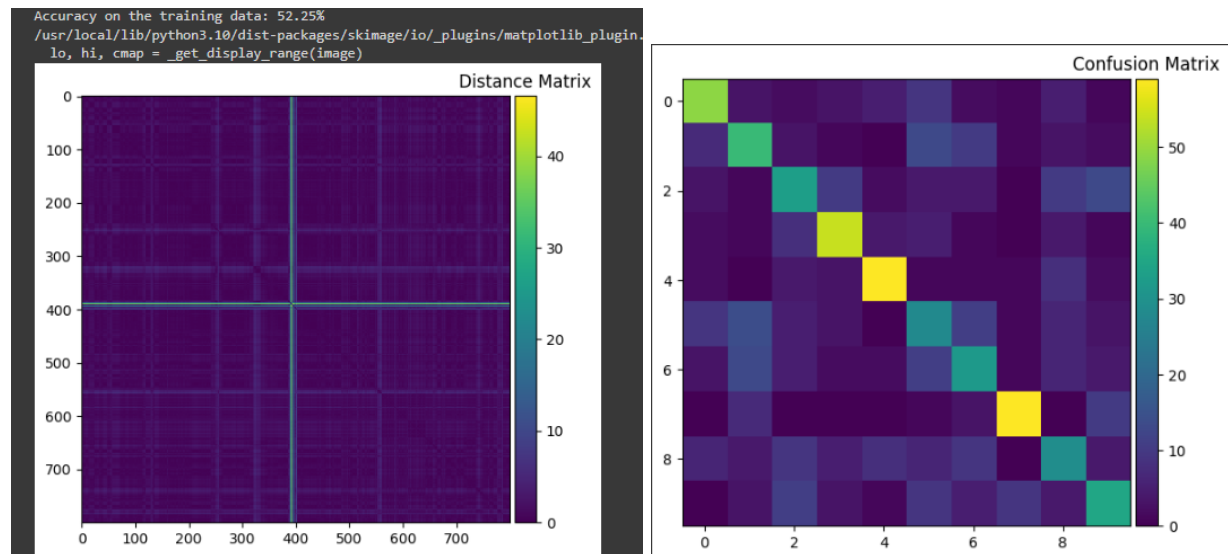
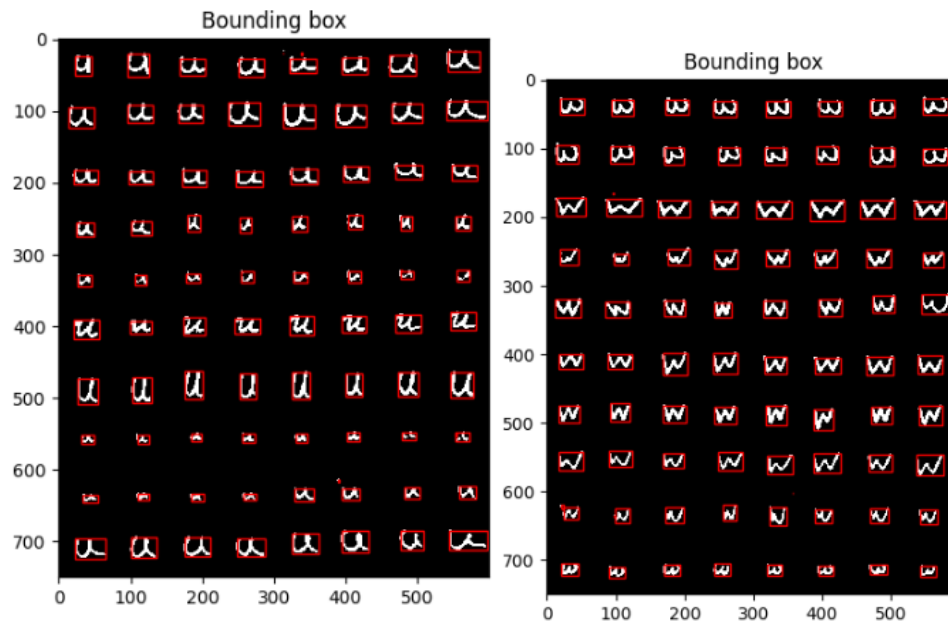


For All Training Images

- Test image connected components with bounding boxes and recognition results



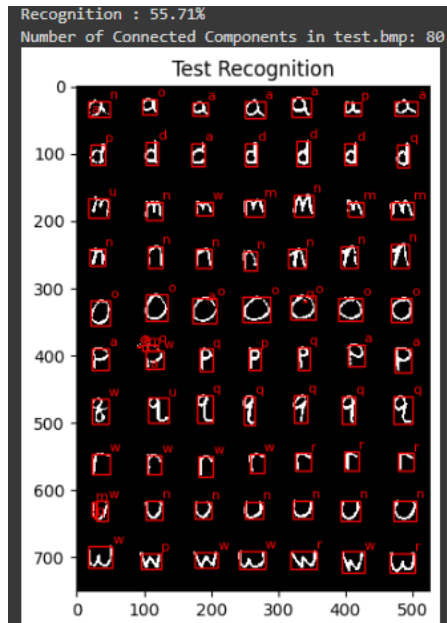




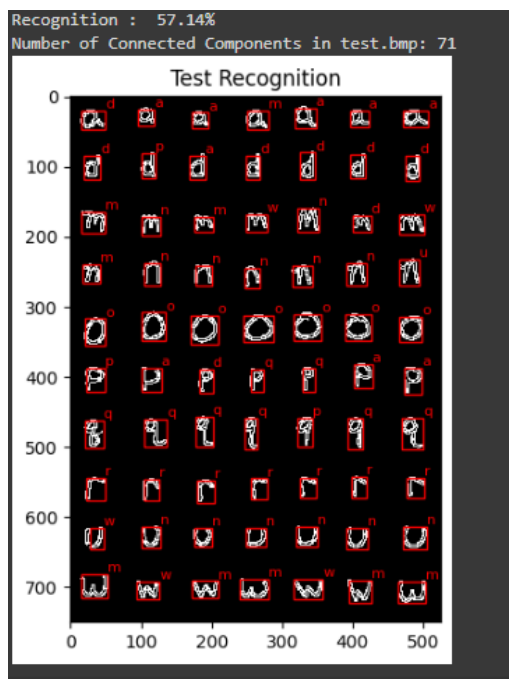
ACCURACY ON TRAINING DATA = 52.25%

- Test image connected components with bounding boxes and recognition results - For every (successful) enhancement

First successful enhancement

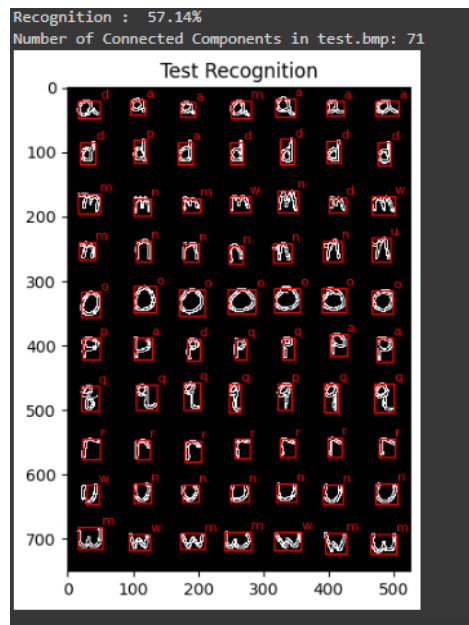


Second successful enhancement

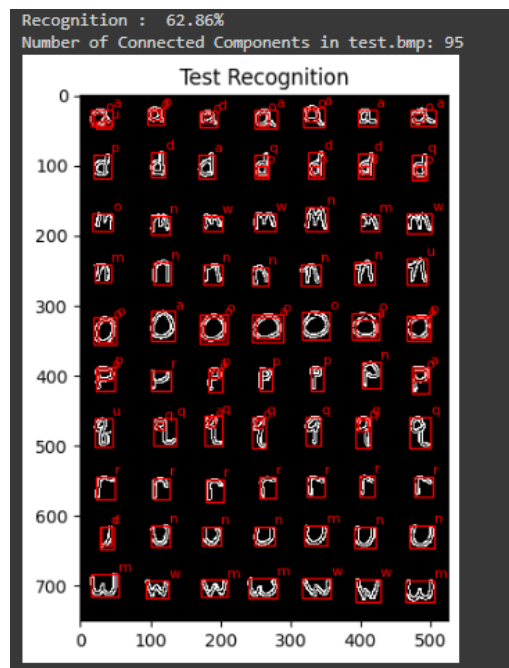


- Test image connected components with bounding boxes and recognition results - For all enhancements combined.

EDGE DETECTION + DIALTION + OTSU THRESHOLD:

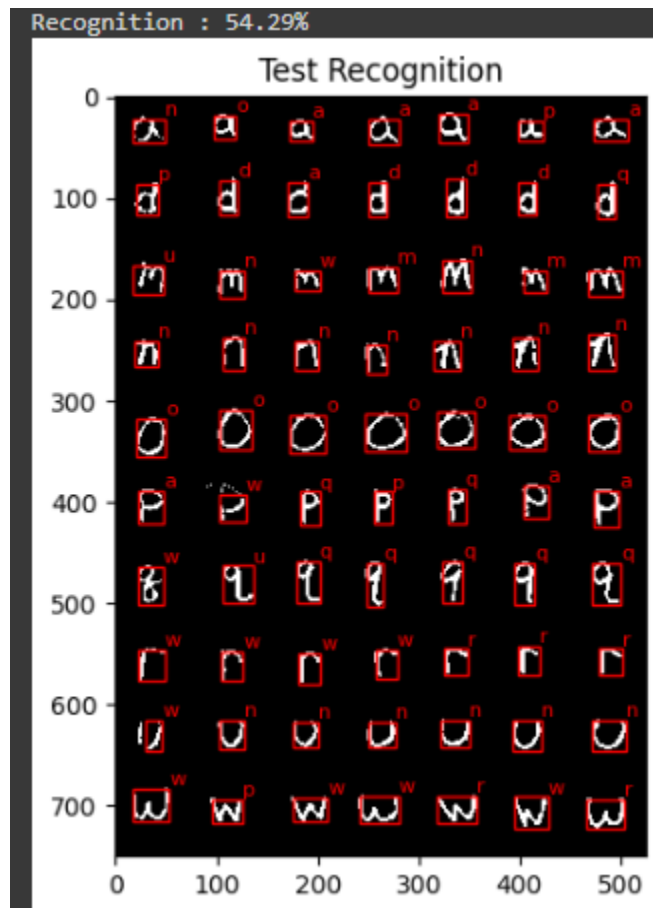


GUASSIAN + EDGE DETECTION + DIALTION + OTSU THRESHOLD:



For Recognition Phase

BASE TESTING RECOGNITION: 54.29%



- **Recognition Rates and Other Values**

In your report list the following values:

TRAINING

BASE THRESHOLD:

BINARY_THRESHOLD: 200

NOISE_THRESHOLD: 8

TEST

BASE THRESHOLD:

BINARY_THRESHOLD: 200

NOISE_THRESHOLD: 9

PROXIMITY: 12

- Threshold value you have picked, or any algorithm you used to find a threshold

In my implementation i have 3 main thresholds to control being: binary image, noise, and proximity

- Binary_image: this threshold can essentially show how clear/ how much noise can be in the binary representation of the image
- Noise: this threshold controls how much small noise is ignored in the binary image
- Proximity: this threshold controls the error in the identified center from the ground truth center

EXPERIMENT ENHANCEMENT:

THRESHOLD FOR EDGE DETECTION, set using otsus method after manual testing

- Number of components you obtained for test image

Number of Components in test = 80

- Recognition rate for the test image

BASE:

BASE TRAINING RATE: 52.25%

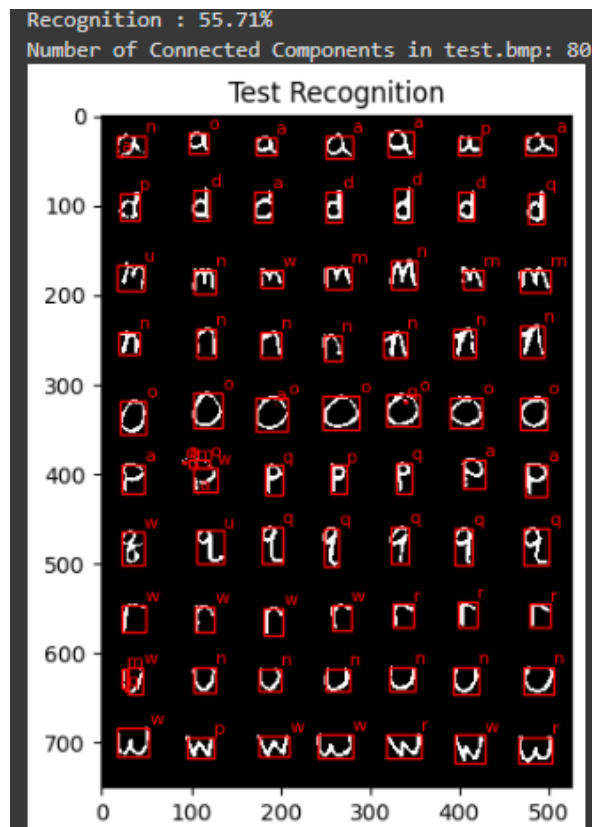
BASE TEST RATE: 54.29%

- Recognition rate for test image after each enhancement

INCREASING THRESHOLD FOR ERROR PROXIMITY FROM CENTER:

TRAINING RATE: 54.29%

TEST RATE: 55.71%



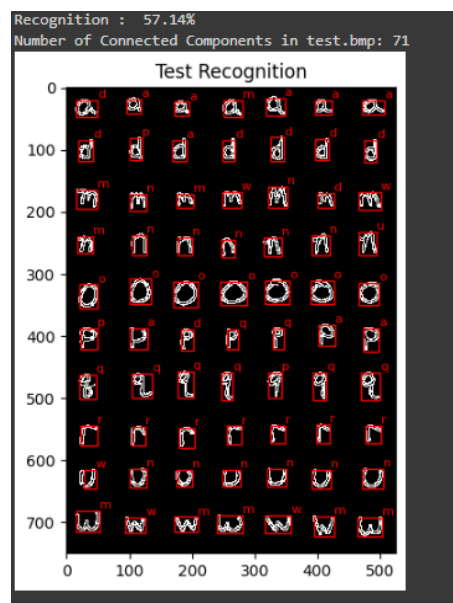
- Recognition rate for test image after all enhancement combined

-EDGE DETECTION + DIALTION + OTSU THRESHOLD:

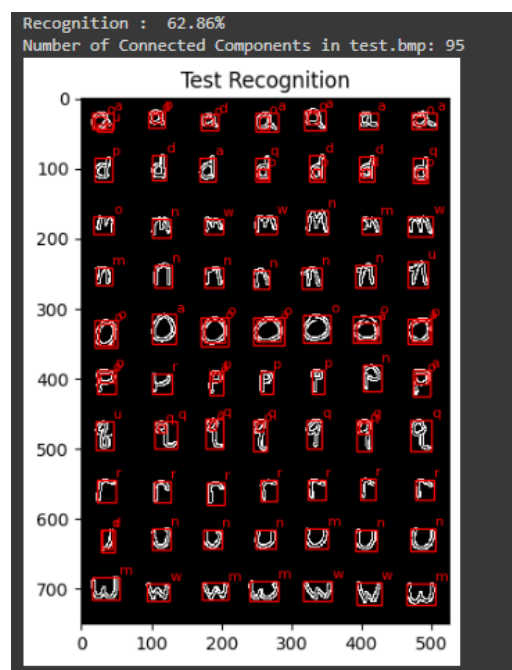
(this combination of enhancement only worked together to improve both recognition, if it was applied individually only only increases testing rate rather than training or itll decrease training)

TRAINING RATE: 52.82%

TEST RATE: 57.14%



-GAUSSIAN BLUR + EDGE DETECTION + DIALTION + OTSU THRESHOLD:
TESTING RATE: 62.86%



Enhancement Experiments:

- First I tried manually adjusting the threshold values for binary_image and elimination of small noise. Which didnt end up working as it would end up decreasing testing recognition rate
- Second I tried performing dilation, erosion, opening and closing operations, but that didnt seem to enhance my rate either, as it would, in some cases, increase one rate and decrease the other. I tried messing with the structure element value for all processes and typically in my case the stucrued value of 2-3 worked best for me
- Third I tried increasing the proximity from the found center to ground truth center value, which worked in increasing my test recognition rate with out decreasing my training.
- Fourth, I used canny edge detection when reading the image, then tried adjusting the threshold values. The manually adjusting the values didnt do much so I automated it using otsu's method. I then decided to use dilation in attempt to close the gaps for edges in each letter for better readability
- Fifth trying to smooth the image with gaussian blur to eliminate noise, applying gaussian blur by itself doesnt enhance the results but using it in combination with edge detection, dilation, and automated thresholding it increases the test recognition rate.