

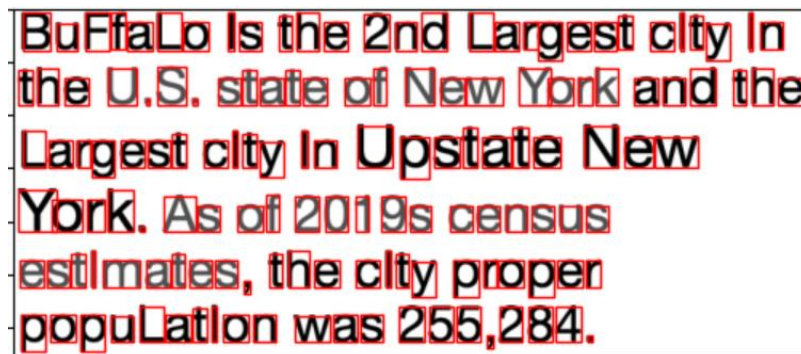
OPTICAL CHARACTER RECOGNITION

1. ENROLLMENT:

- Calculated the mean for all the character template images and used the minimum mean of all the characters as a threshold to binarize each character template image.
- Converting the pixels greater than the threshold as background pixels (0) and lesser than the threshold as foreground pixels (255).
- Using Canny Edge Detection extracted the features of each character template.
- Removed all the rows and columns with only zeros and added a padding layer of 1 to all the features extracted.
- These features are stored for Recognition.

2. DETECTION:

- After binarizing the image, Connected Component Labelling is used to detect various characters in the test image.
- First Pass: If the above pixel and left pixel of the current pixel is a background pixel then assign a new label to the current pixel. If the above pixel is a foreground pixel assign the above pixel label to the current pixel label or if the left pixel then the label of the left pixel is assigned.
- Second Pass: In the first pass all the above pixels were given priority so in the second pass the left pixels are compared with the current pixel if they have the same pixel values but their labels are different then the left pixel label is assigned to all the pixels(labels) with the same value(label).
- Using the labels above we get the top left corner and bottom right corner positions for each character in the test image to draw a bounding box around them.



- Using the positions retrieved the test image is cropped into individual characters and for each character in the test image features are extracted using the Canny edge detection and a padding layer of 1 is added to all the features.
- The features and positions are stored for Recognition.

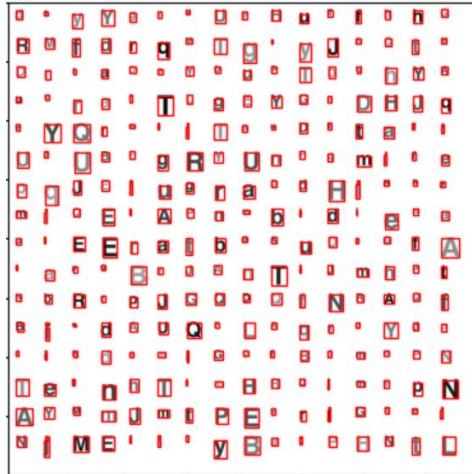
3. RECOGNITION:

- Each template is resized with the resolution of the character in the test image.
- For matching the characters from the test image with the character templates **Normalised Cross-Correlation** technique is used which tells us how similar the two images are. (Similarity)
- Given a threshold of 0.37, if the calculated NCC is greater than the threshold the character is matched with the template else the character is 'UNKNOWN'.

F1 score for Data:

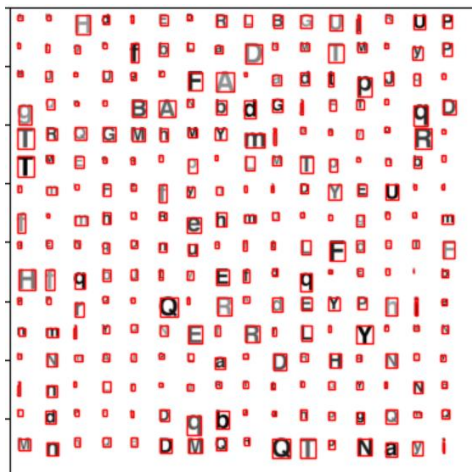
```
PS C:\Users\91900\Desktop\Project1> python evaluate.py --preds results.json --groundtruth data/groundtruth.json  
0.904109589041096
```

F1 score for testcase_000000:



```
PS C:\Users\91900\Desktop\Project1> python evaluate.py --preds results.json --groundtruth testcase_000000/groundtruth.json  
0.6296296296296297
```

F1 score for testcase_000001:



```
PS C:\Users\91900\Desktop\Project1> python evaluate.py --preds results.json --groundtruth testcase_000001/groundtruth.json  
0.75
```