Assignment 3

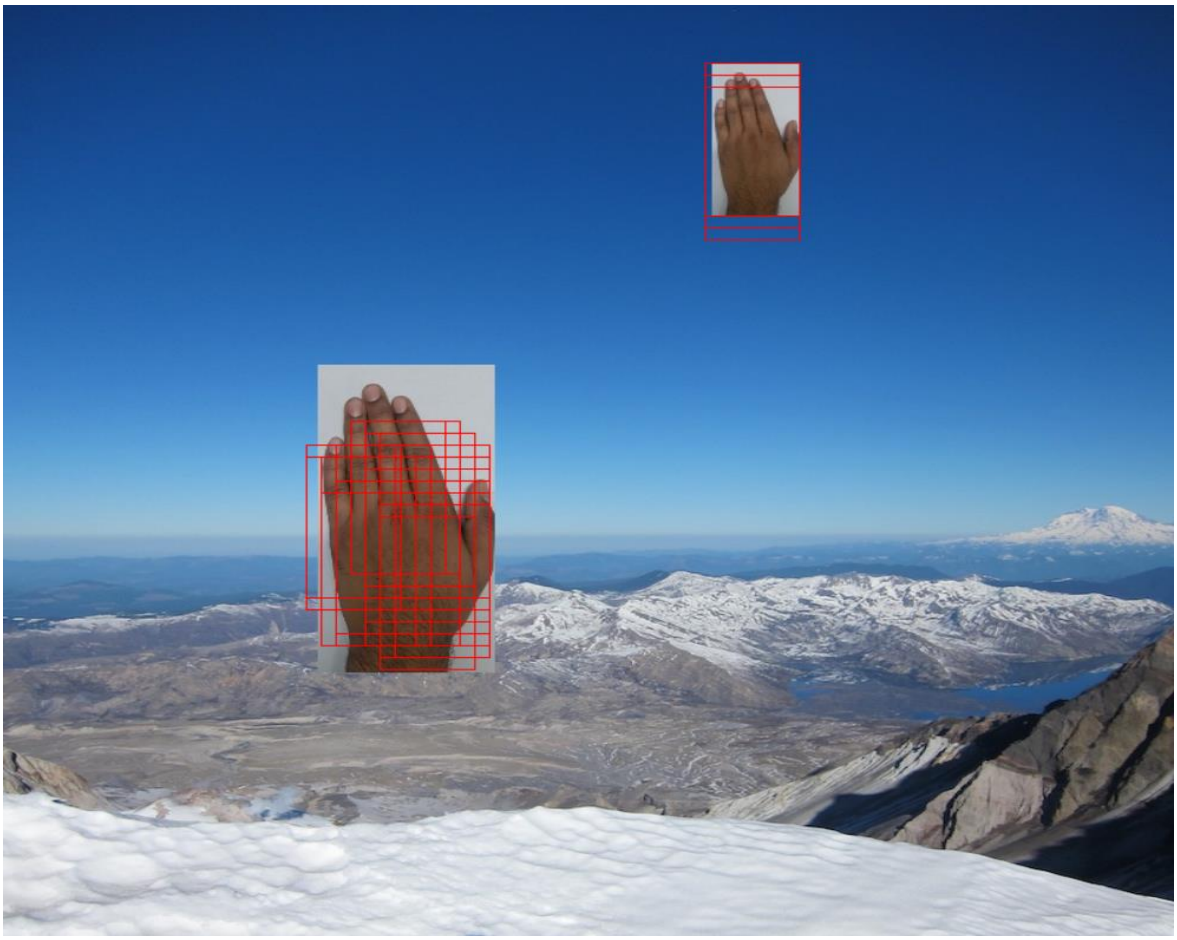
Part 1

1. Calculated HOG vector of 3780 size on patch size of 8*8.

2. Training set was hand images and ImageNet dataset.

3. Created a pyramid of size 6 and iterated over the image to detect hands.

4. Calculated the overlap of hands in the image and used non max suppression.



Part 2

1. I calculated HOG for open and close hand, after cleaning the dataset.
2. To make it invariant to color change and rotation invariant I added augmented data as well.

3. I trained SVM using the dataset and tested on valid dataset provided.
4. Plotted AUROC curve.

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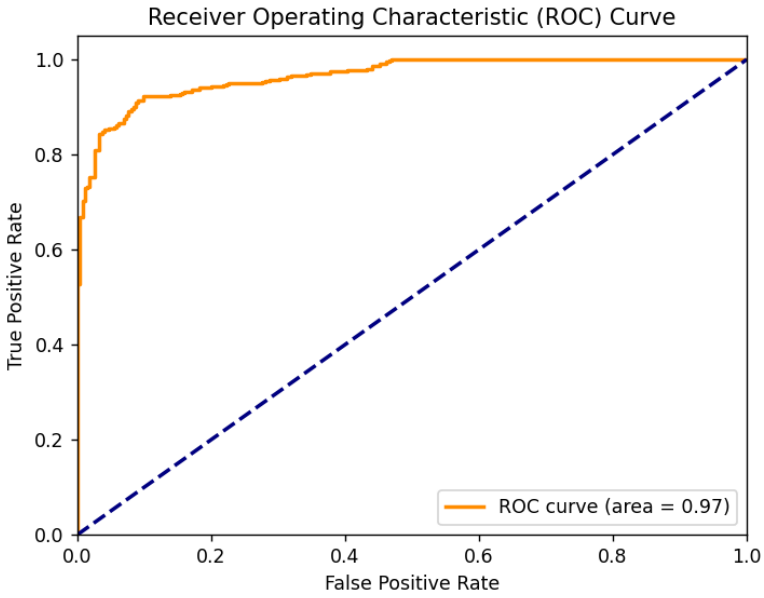
Classification Report:
              precision    recall  f1-score   support

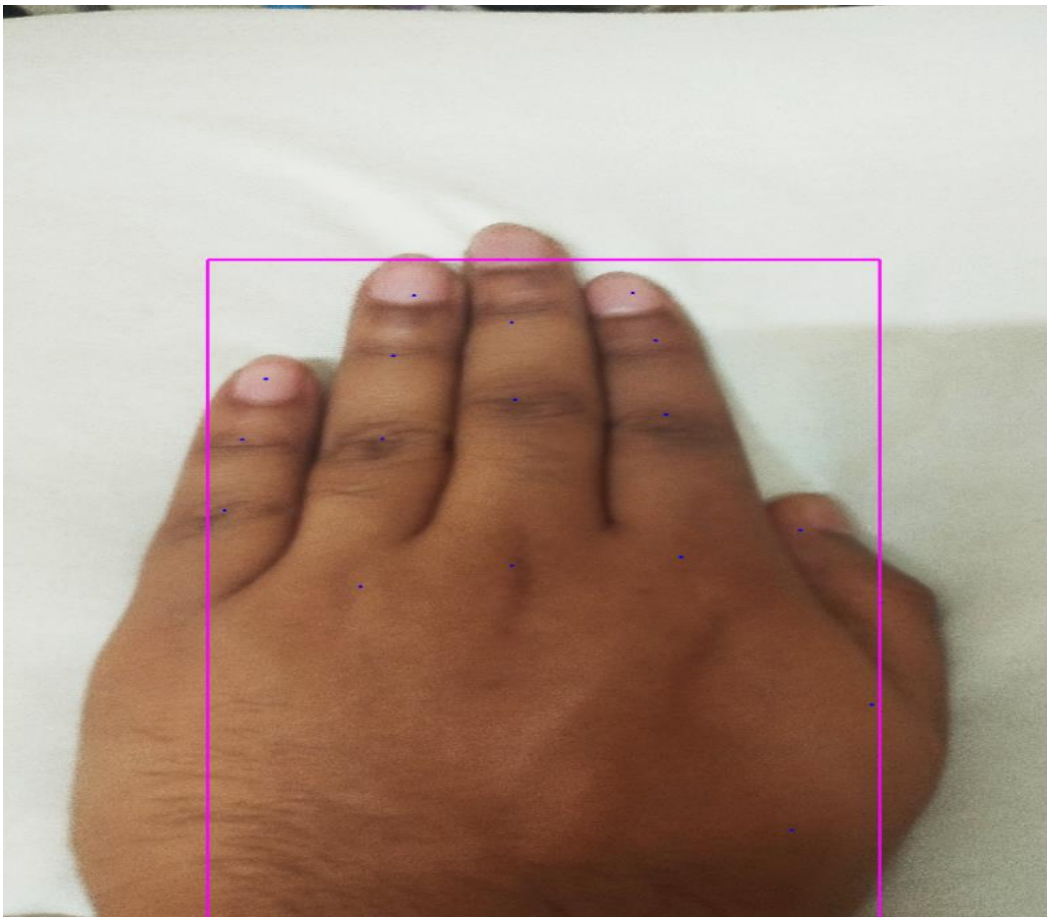
         0.0       1.00      0.49      0.66       275
         1.0       0.78      1.00      0.88       511

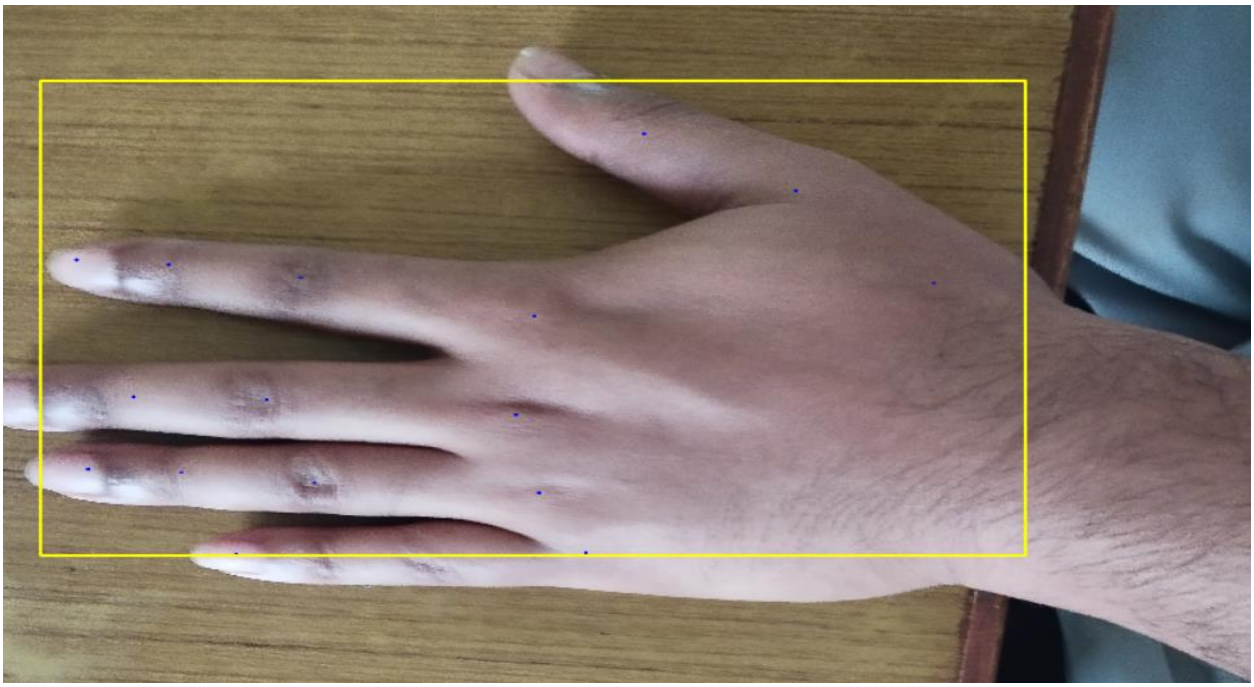
    accuracy                           0.82       786
   macro avg       0.89      0.75      0.77       786
weighted avg       0.86      0.82      0.80       786

ROC AUC Score: 0.9660131649172745
```



I have marked my close hand **purple** and my open hand **yellow.**





Above are my hands, not the dataset hands.

Bonus – Using this I created a game like feature where my window shuts down when the hand is in close position only.

Tools used- Python, mediapipe, joblib(to save model as pickle file), cv2.

Problems faced –

1. The data was not very good. I had to use data cleaning. I removed two hands picture from training set.

2. To overcome the color changes of hand i had to augment the data with color jitters.

3. Background still matters as good detection is happening still on white background.

Result and Conclusion -

Recall is not good for close hands because I removed hands in training data where thumb is not close to first finger.

Recall and precision for open hand is good.

Submission – Include dataset to test and look for main.py. run with

python main.py Final_dataset/Test/open Final_dataset/Test/close

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