CAPSTONE PROJECT

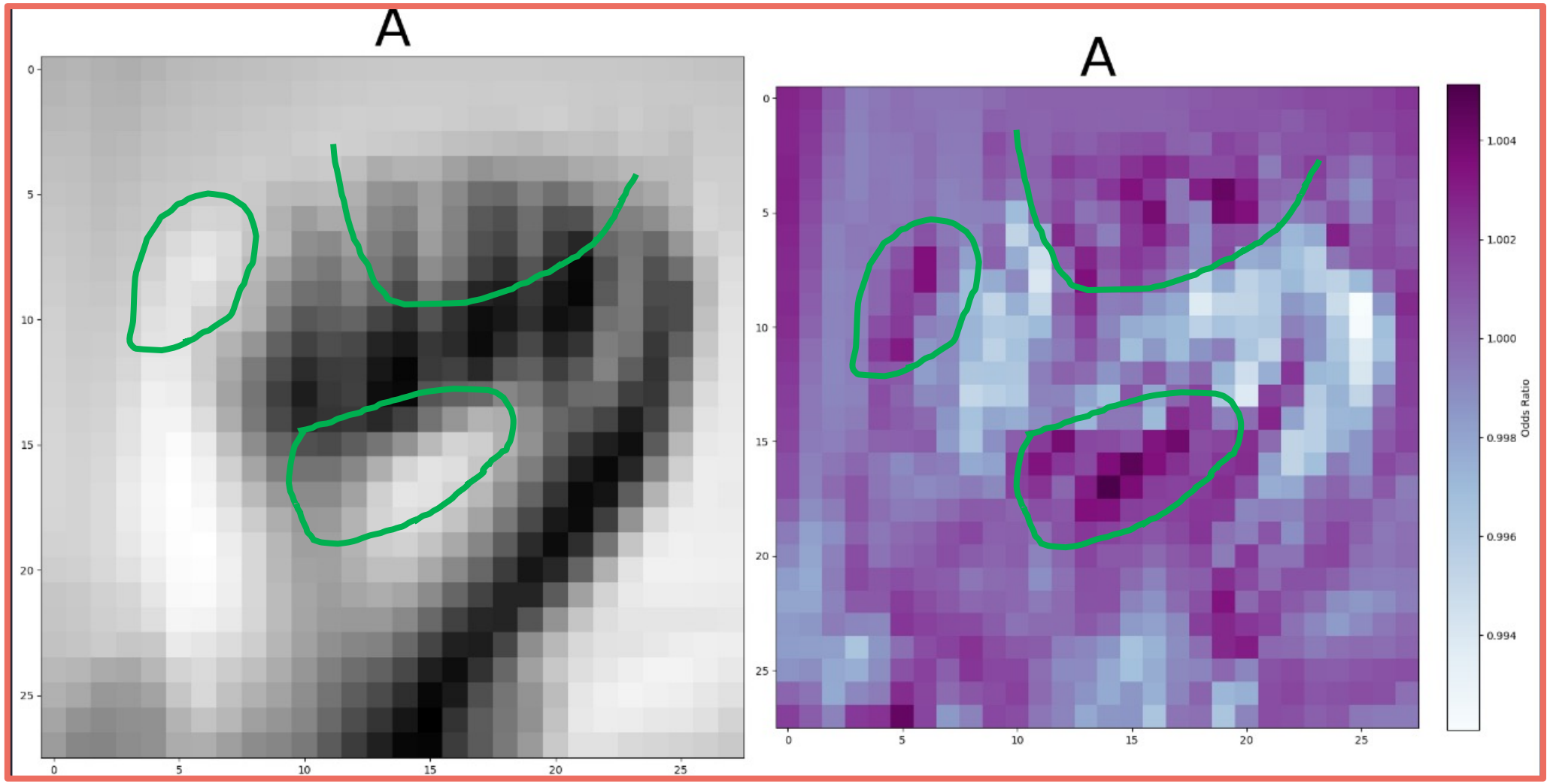
SIGN-LINGUAL

BY SIMREN BASRA

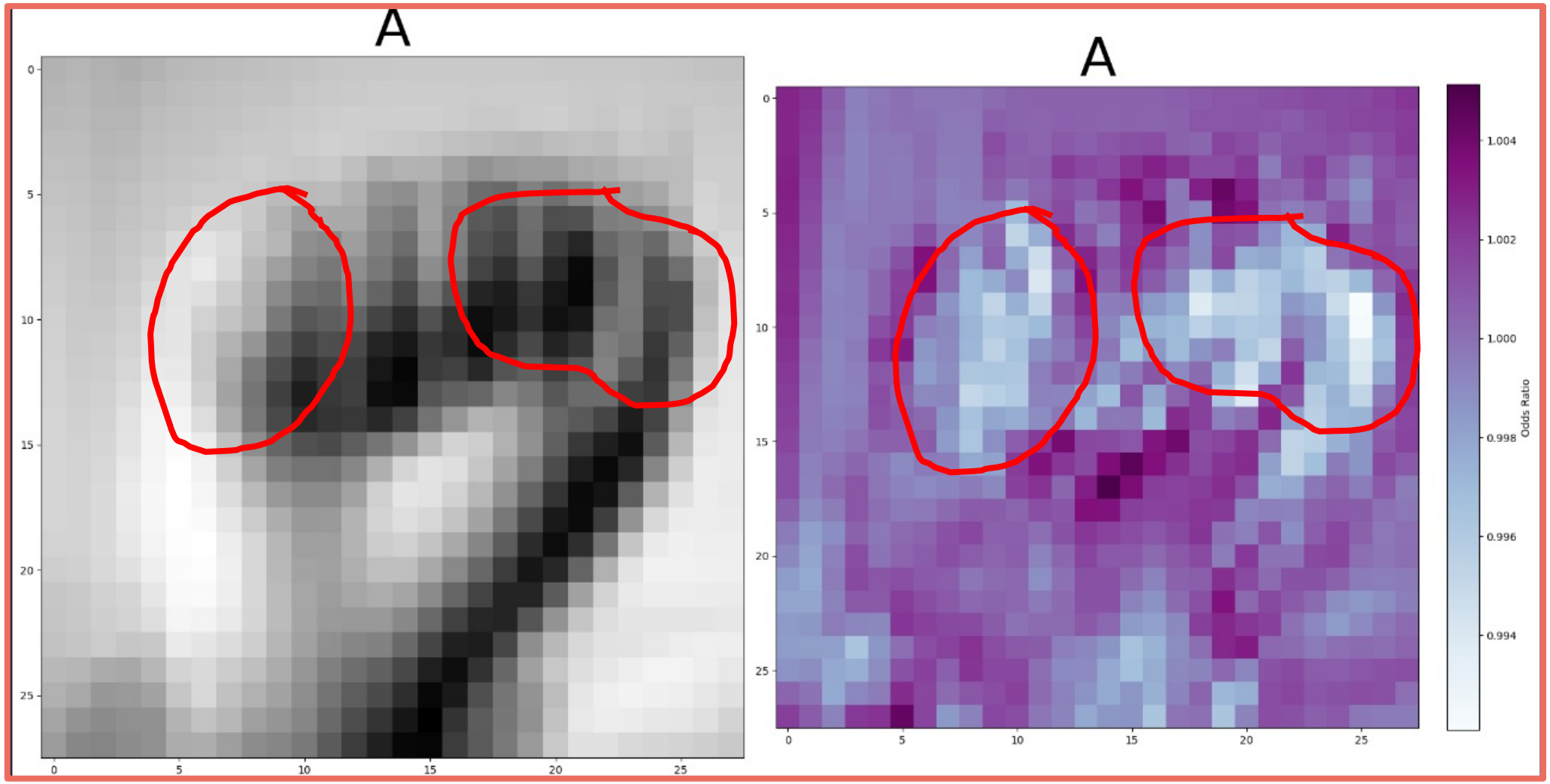
PROBLEM STATEMENT

- Over 300 different sign languages are spoken by more than 72 million people worldwide.
- Great disparity between signers and non-signers.
- To bridge the gap between signers and non-signers, my idea is to develop a machine learning sign language interpreter.

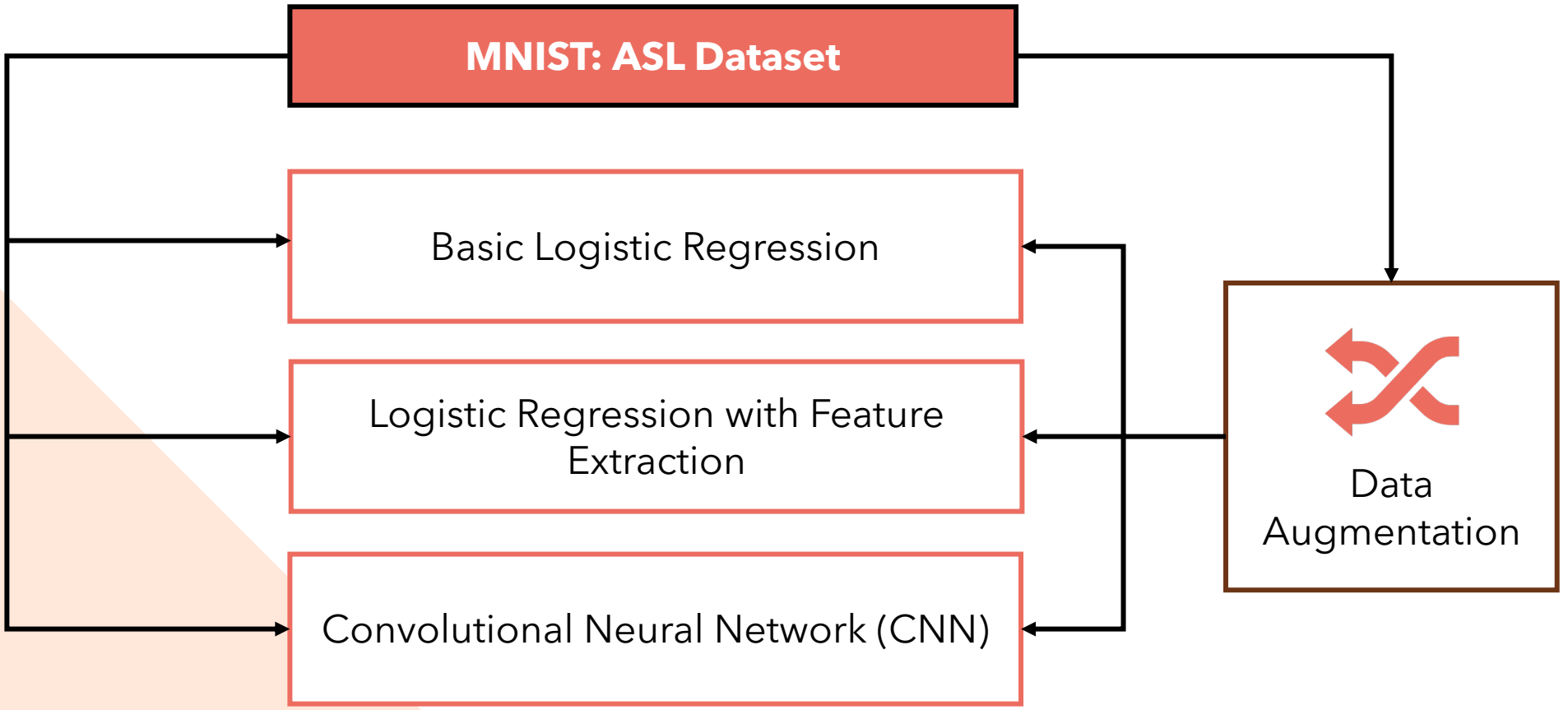
SPRINT 1: INSIGHTS



SPRINT 1: INSIGHTS



SPRINT 2: AN OVERVIEW



MODEL COMPARISON

Model	Train Accuracy	Validation Accuracy	Misclassifications
Logistic Regression	99.99	99.98	G - H [1]
Logistic Regression with Feature Extraction	99.03	98.86	M – S [8] R – D [8] U - R [5]
CNN	99.95	99.93	R – D [3] T -H [1] W –X [1]

FEATURE EXTRACTION

Input Image of A

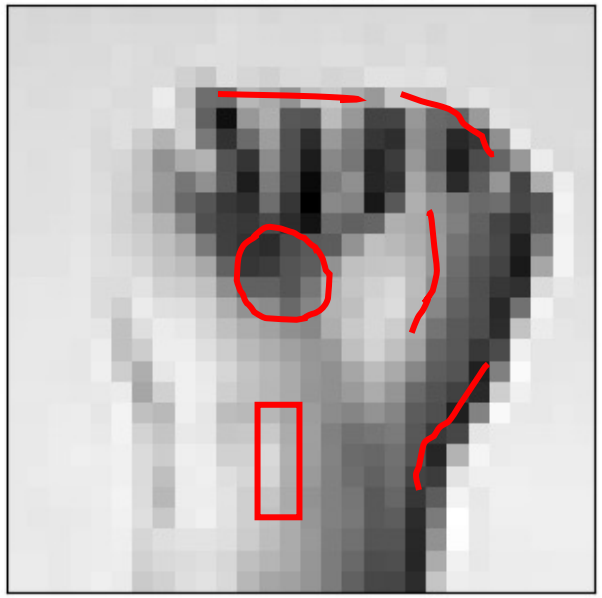


Image of A after HOG

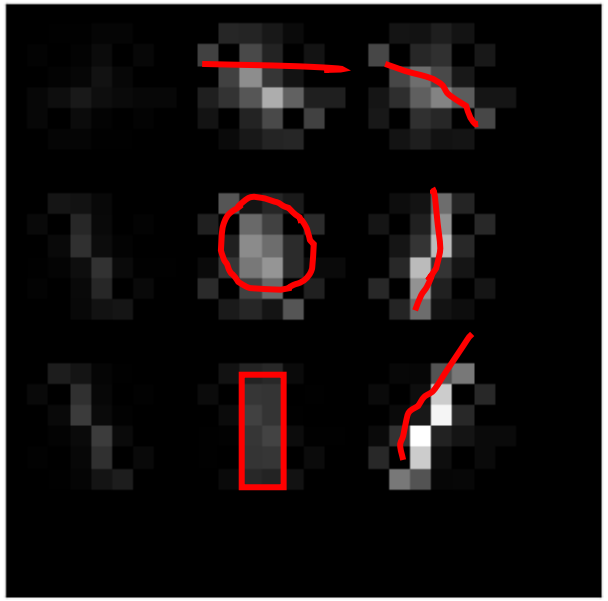
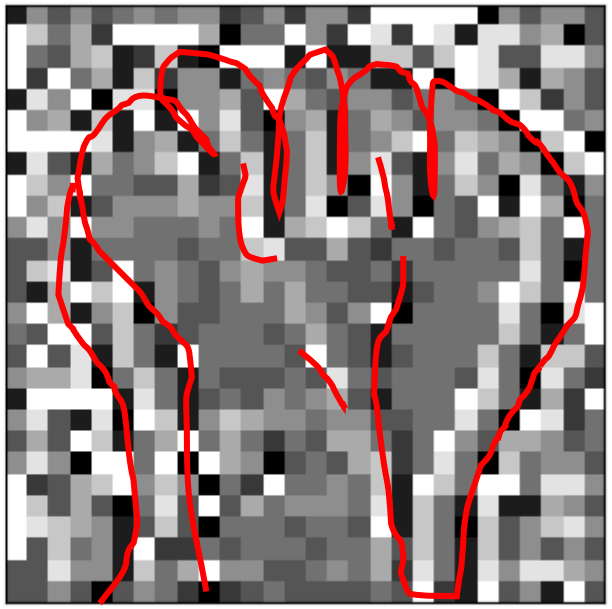
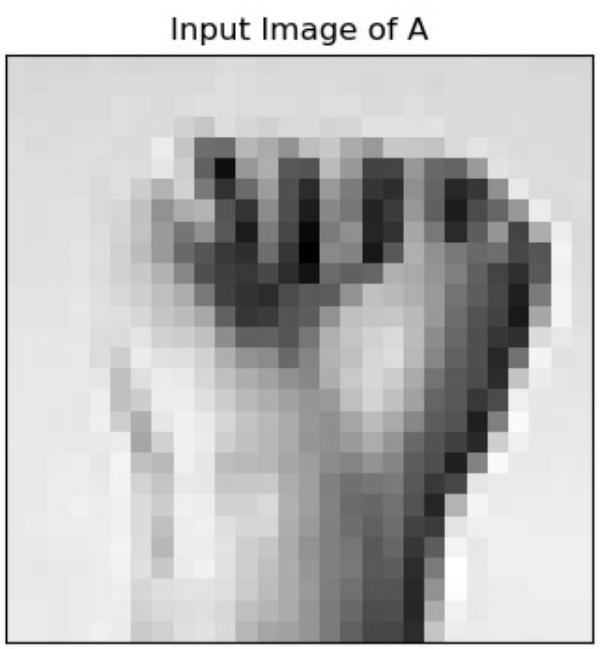


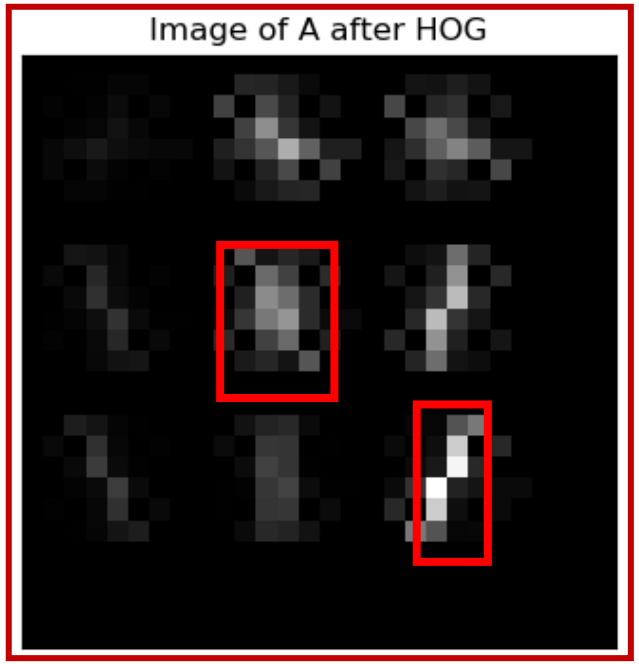
Image of A after LBP

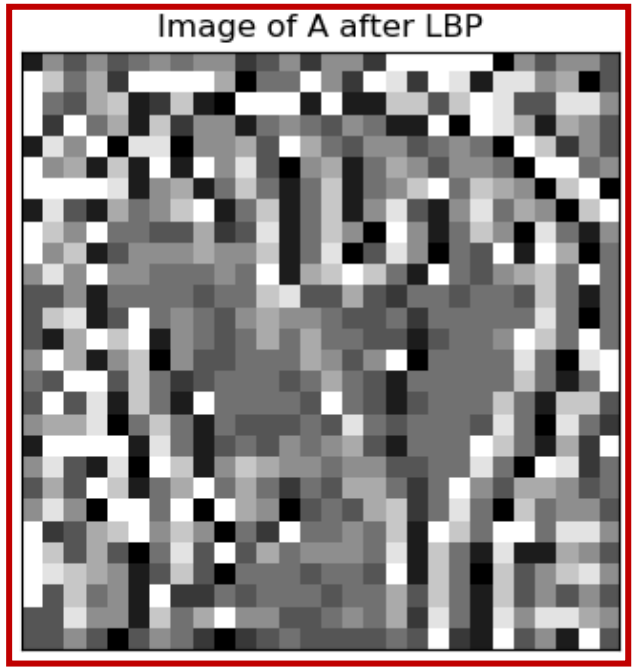


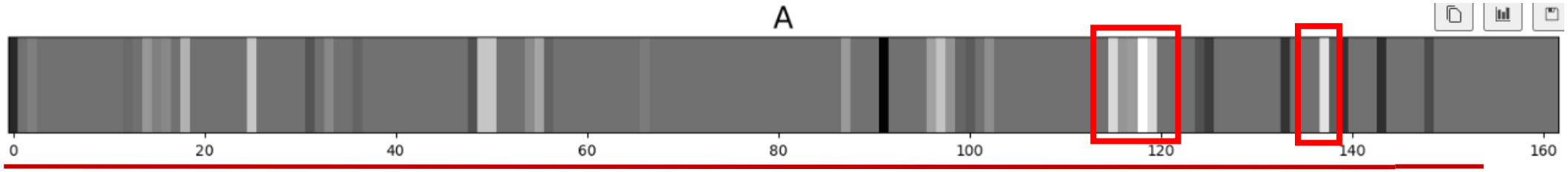
Colour Histogram + HOG – Histogram of Gradients + LBP - Local Binary Patterns

FEATURE EXTRACTION

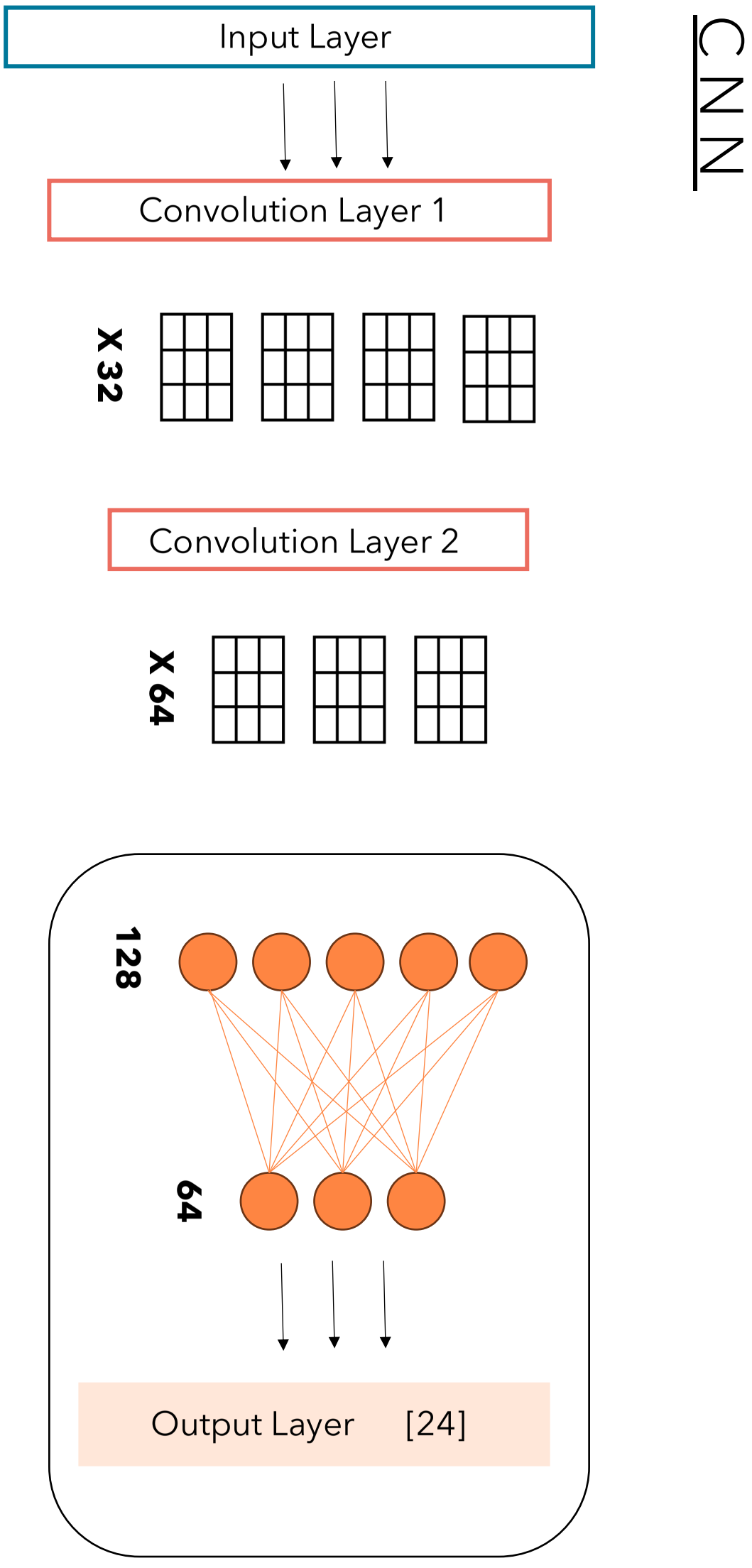








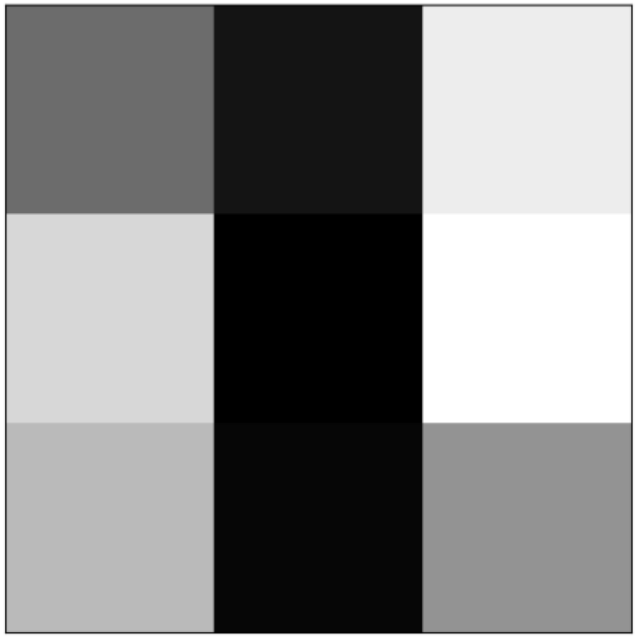
CNN


Input Layer
Convolution Layer 1
X 32
Convolution Layer 2
X 64
128
64
Output Layer [24]

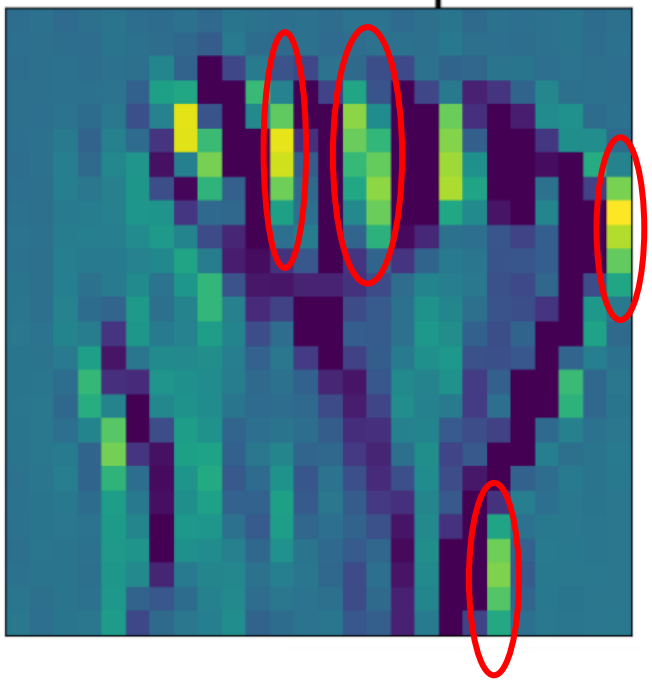
CNN – CONV LAYER 1

Input Image

Filter 1



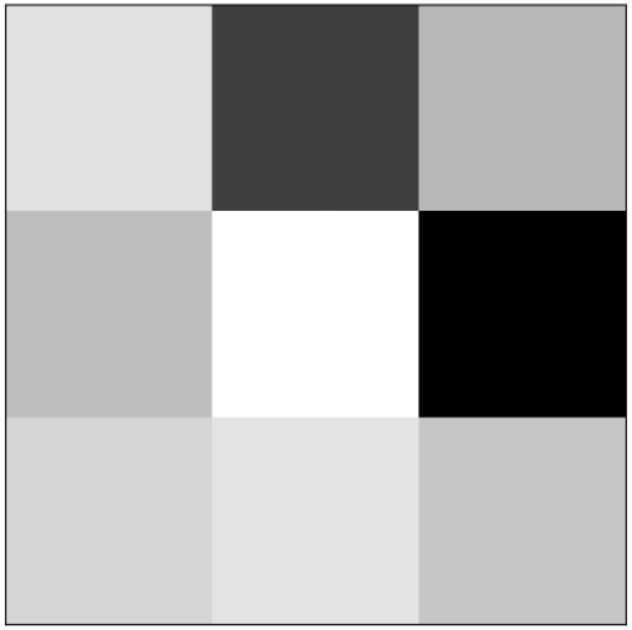
Filter 1 Output



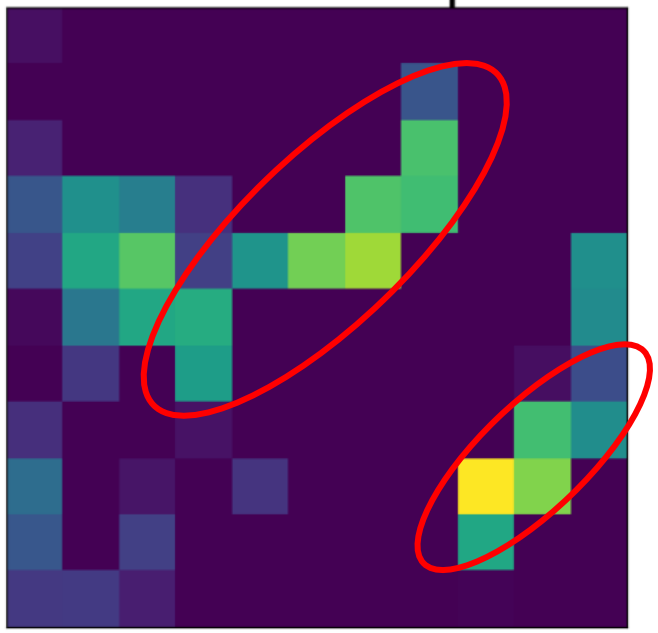
CNN – CONV LAYER 2

Input Image

Filter 59

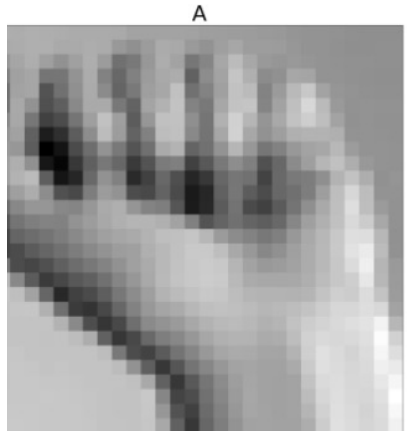


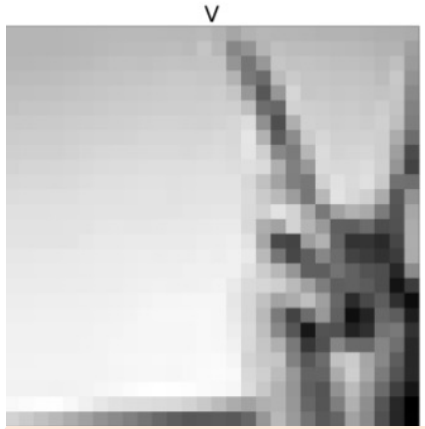
Filter 59 Output

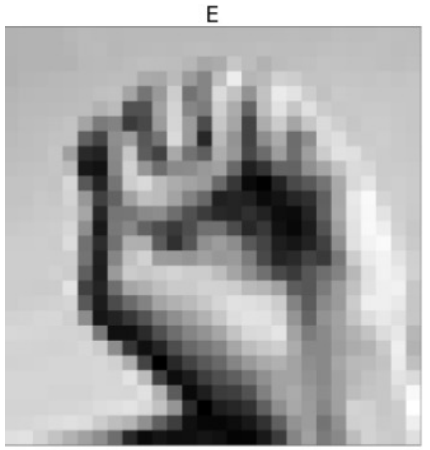


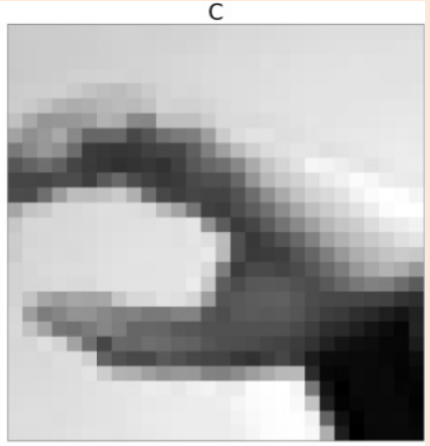
DATA AUGMENTATION

```
train_datagen = ImageDataGenerator(
rescale=1./255,
rotation_range=20,
width_shift_range=0.2,
height_shift_range=0.2,
shear_range=0.2,
zoom_range=0.2,
horizontal_flip=True,
fill_mode='nearest'
)
```









DATA AUGMENTATION

Model	Non -Augmented	Augmented *
Logistic Regression	99.92	25.49
	99.87	17.42
Logistic Regression with Feature Extraction	99.03	40.83
	98.86	36.69
CNN	99.95	78.00
	99.93	94.54

** Augmentation applied on the training data only*

NEXT STEPS

MNIST: ASL Dataset

- Basic Logistic Regression
- Logistic Regression with Feature Extraction
- Convolutional Neural Network (CNN)

Data Augmentation ⊕

Real Data

- Basic Logistic Regression
- Logistic Regression with Feature Extraction
- Convolutional Neural Network (CNN)
- VGG(16)
- ResNet(25)

ANY QUESTIONS?