

MLSP Assignment 1

Introduction

I have created an ML based DNN model with 3 layers to do multi class classification of various sounds given in the form of Mel Spectrograms.

The model I have created involves parameter training over 50 epochs, on 800 train samples given. I have used the remaining 200 given samples as mock test data. Further, I have trained it over batches of 80 parameters at a time.

My Method

I created a DNN model with 3 layers and 400, 200 and 10 parameters in each respective layer. I have trained the model over 50 epochs with an accuracy of 83%. I came to these values of parameters and number of layers after extensive training and parameter variation.

Then, I have ran the test from the given test samples to get the predicted value of the model.

I have manually calculated the confusion matrix, precision matrix, recall matrix and the f1 score.

Confusion Matrix –

```
[ [ 1.  1.  2.  1.  4. 13.  0.  0.  3.  0.]
  [ 0.  7.  0.  3.  5.  2.  0.  0.  0.  1.]
  [ 0.  0. 12.  0.  0.  0.  1.  3.  1.  1.]
  [ 0.  1.  0.  4.  0.  2. 10.  0.  0.  1.]
  [ 5.  0.  1.  0. 10.  1.  0.  0.  0.  1.]
  [ 1.  3.  0.  0.  1. 10.  0.  2.  1.  0.]
  [ 0.  0.  1.  0.  1.  1.  9.  2.  2.  2.]
  [ 0.  1.  2.  1.  6. 10.  0.  6.  1.  0.]
  [ 0.  1.  1.  0.  2. 11.  1.  0.  7.  1.]
  [ 0.  2.  1.  1.  1.  4.  1.  0.  4.  4.]]
```

Precision –

```
[0.04      0.38888889 0.66666667 0.22222222 0.55555556 0.55555556
 0.5       0.22222222 0.29166667 0.22222222]
```

Recall –

```
[0.14285714 0.4375      0.6       0.4       0.33333333 0.18518519
 0.40909091 0.46153846 0.36842105 0.36363636]
```

F1 score –

```
[0.0625      0.41176471 0.63157895 0.28571429 0.41666667 0.27777778
 0.45       0.3       0.3255814 0.27586207]
```

Final F1 score = 0.3437445847723859

Observations and Discussion –

One main observation I made is that my model fared quite poorly on the test data that was provided. The sound of “Bark” was only predicted accurately once, and let do a huge degrade in precision and recall of the model.

Another key observation I made is that implementation of mock test data from train data is very important, as precision and accuracy in real testing indicate sub-optimal results.

Also, the knn model I implemented did not yield great results. This tells me that NN based models are generally stronger compared to single stage models, with more trainable parameters.