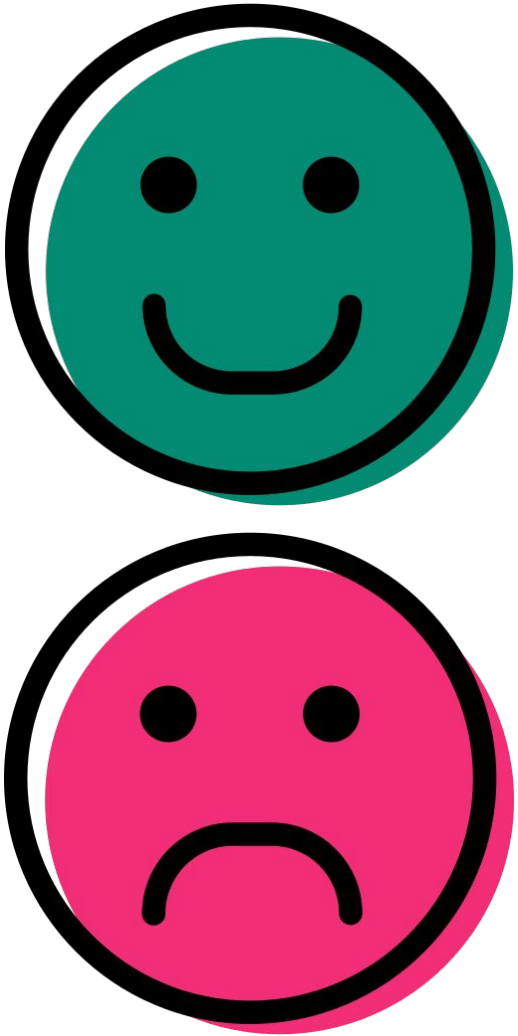
Audio Emotions Classification

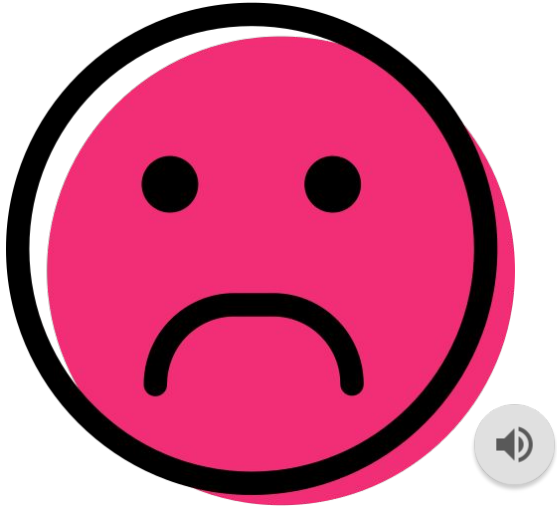
Classify happy and sad mood



Audio Emotions Dataset

Happy Class

400 Observations



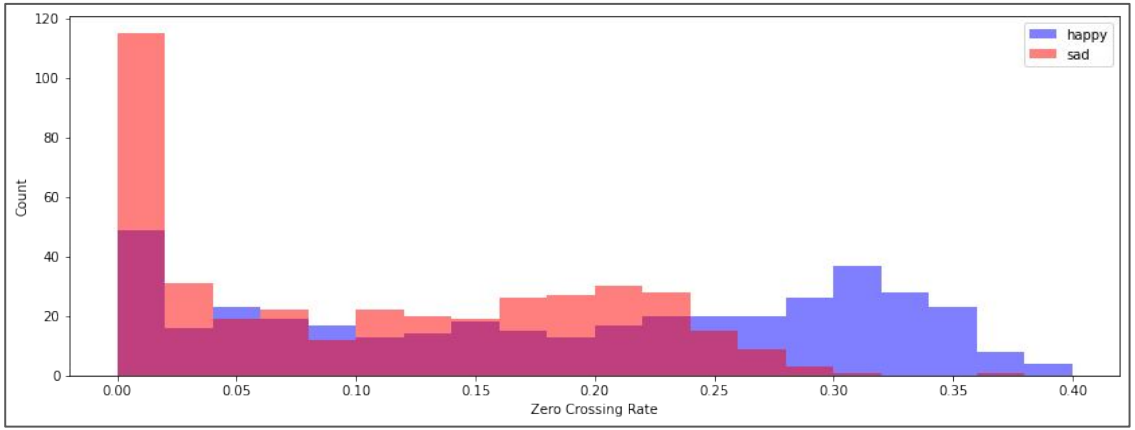
Sad Class

400 Observations

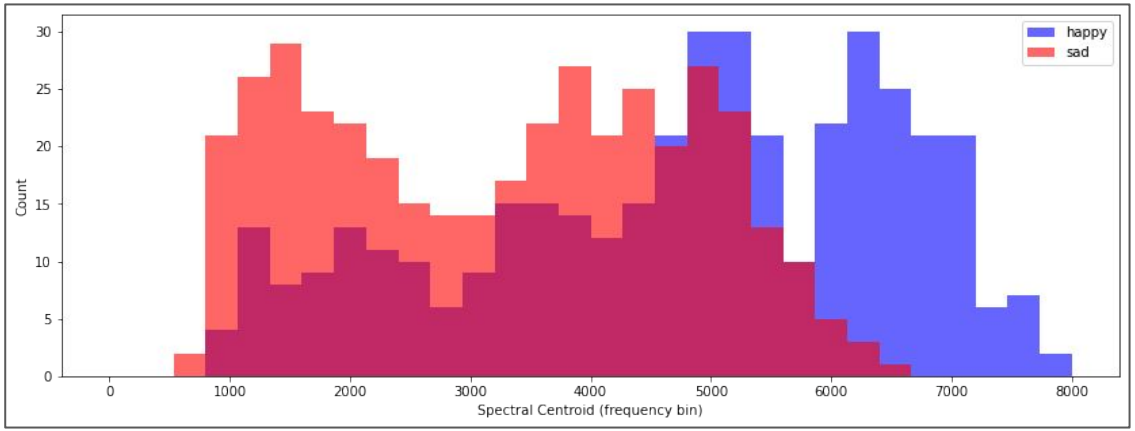
Baseline Model

Extract Features

- Zero Crossing Rate

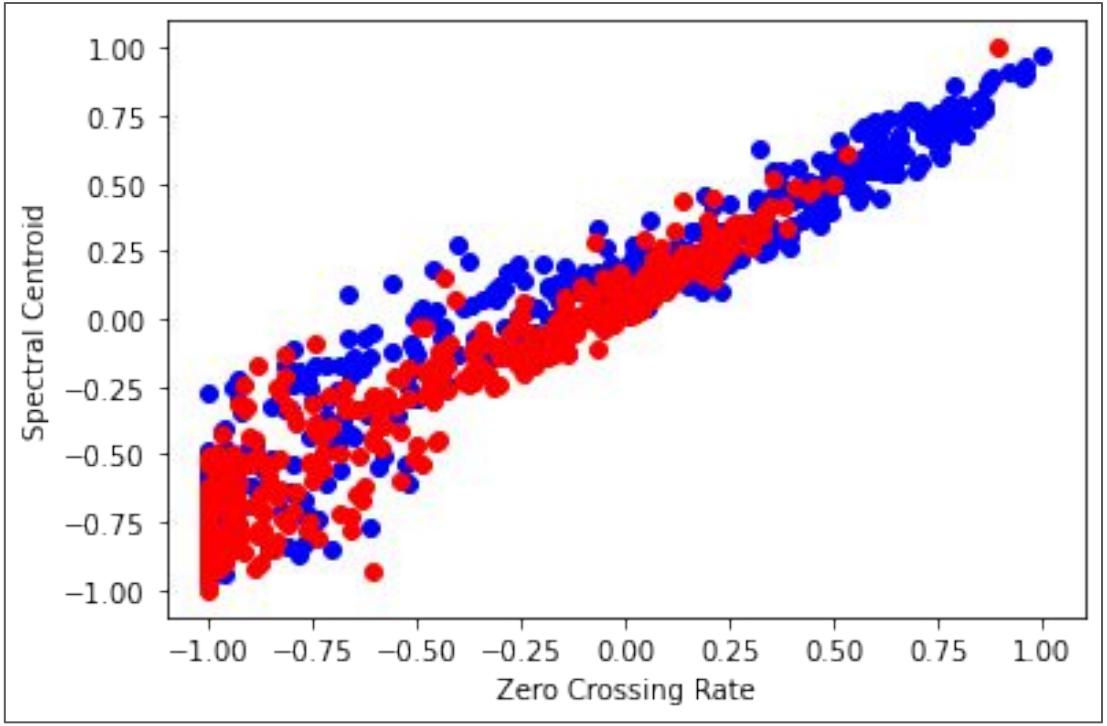


- Spectral Centroid



Baseline Model

Comparation Features



Baseline Model

Define Model

```
def create_model():
    model = Sequential()
    model.add(Dense(8, input_shape=(2,)))
    model.add(LeakyReLU(alpha=0.1))
    model.add(Dropout(0.1))
    model.add(Dense(2, activation='softmax'))
    return model
```

Compile Model

```
model = create_model()
model.summary()
adam_optim = Adam(learning_rate = 0.0001)
model.compile(optimizer=adam_optim, loss='categorical_crossentropy', metrics=['accuracy'])
```

Baseline Model

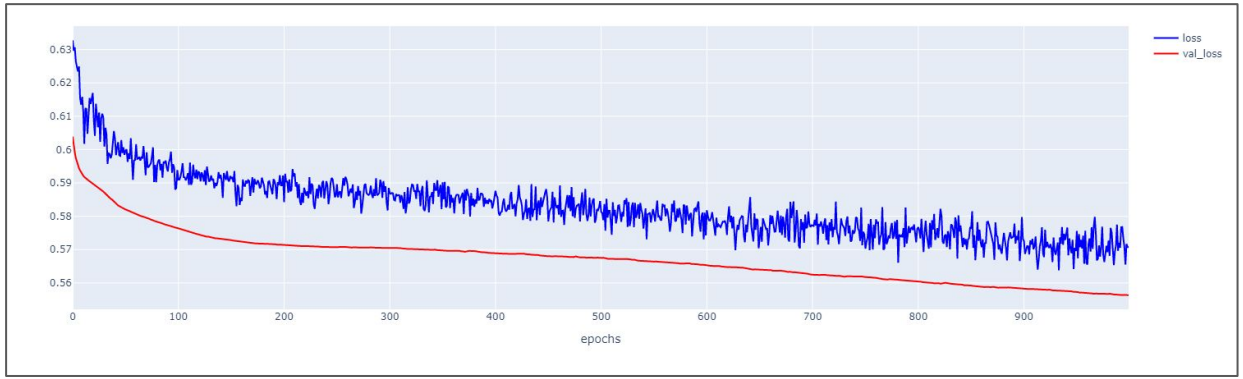
Train Model

```
his = model.fit(x_train, y_train, batch_size=1, epochs=1000, verbose=1,
                validation_data = (x_val, y_val) )
```

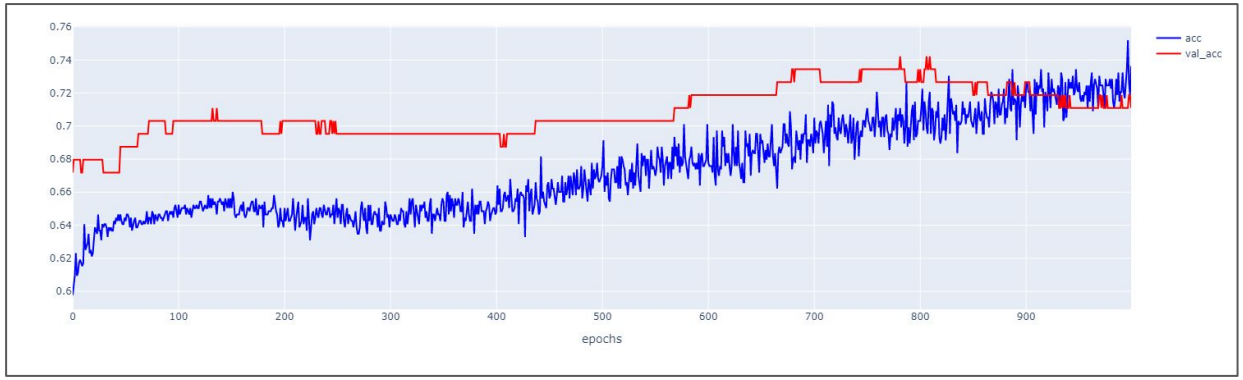
```
Epoch 990/1000
512/512 [==============================] - 2s 4ms/step - loss: 0.5697 - accuracy: 0.7207 - val_loss: 0.5564 - val_accuracy: 0.7109
Epoch 991/1000
512/512 [==============================] - 2s 4ms/step - loss: 0.5721 - accuracy: 0.7207 - val_loss: 0.5564 - val_accuracy: 0.7188
Epoch 992/1000
512/512 [==============================] - 2s 4ms/step - loss: 0.5706 - accuracy: 0.7324 - val_loss: 0.5564 - val_accuracy: 0.7109
Epoch 993/1000
512/512 [==============================] - 2s 4ms/step - loss: 0.5767 - accuracy: 0.7207 - val_loss: 0.5564 - val_accuracy: 0.7109
Epoch 994/1000
512/512 [==============================] - 2s 4ms/step - loss: 0.5767 - accuracy: 0.7168 - val_loss: 0.5564 - val_accuracy: 0.7109
Epoch 995/1000
512/512 [==============================] - 2s 4ms/step - loss: 0.5734 - accuracy: 0.7246 - val_loss: 0.5564 - val_accuracy: 0.7109
Epoch 996/1000
512/512 [==============================] - 2s 4ms/step - loss: 0.5708 - accuracy: 0.7344 - val_loss: 0.5564 - val_accuracy: 0.7109
Epoch 997/1000
512/512 [==============================] - 2s 4ms/step - loss: 0.5655 - accuracy: 0.7520 - val_loss: 0.5563 - val_accuracy: 0.7109
Epoch 998/1000
512/512 [==============================] - 2s 4ms/step - loss: 0.5717 - accuracy: 0.7266 - val_loss: 0.5564 - val_accuracy: 0.7188
Epoch 999/1000
512/512 [==============================] - 2s 4ms/step - loss: 0.5708 - accuracy: 0.7188 - val_loss: 0.5564 - val_accuracy: 0.7188
Epoch 1000/1000
512/512 [==============================] - 2s 4ms/step - loss: 0.5707 - accuracy: 0.7363 - val_loss: 0.5564 - val_accuracy: 0.7109
```

Baseline Model

- Plot Loss

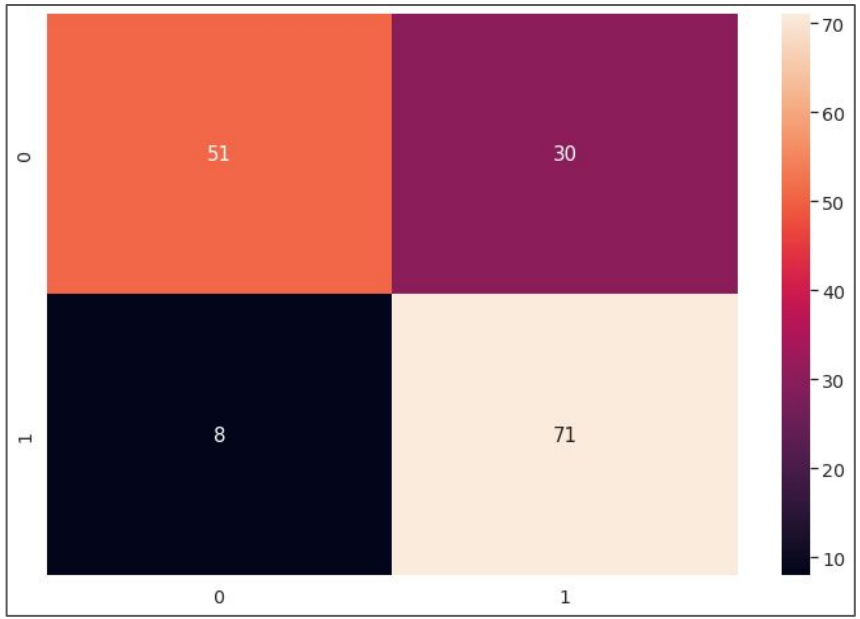


- Plot Accuracy



Baseline Model

Confusion Matrix



Evaluate Model

```
Test Loss::  0.040302444249391556
Test Accuracy::  0.9750000238418579
```

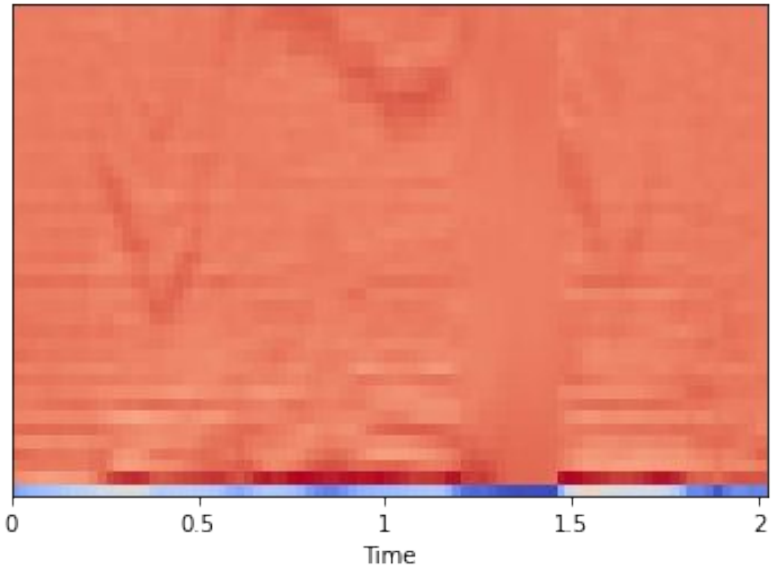
Classification Report

	precision	recall	f1-score	support
Happy	0.8644	0.6296	0.7286	81
Sad	0.7030	0.8987	0.7889	79
accuracy			0.7625	160
macro avg	0.7837	0.7642	0.7587	160
weighted avg	0.7847	0.7625	0.7584	160

CNN Model

Extract Features

- Mel Frequency Cepstral CoefficientZero Crossing Rate (MFCC)



CNN Model

Define Model

```
model = Sequential()
model.add(Conv2D(filters=16, kernel_size=2, input_shape=(40, 200, 4), activation='relu'))
model.add(MaxPooling2D(pool_size=2))
model.add(Dropout(0.2))
model.add(Conv2D(filters=32, kernel_size=2, activation='relu'))
model.add(MaxPooling2D(pool_size=2))
model.add(Dropout(0.2))
model.add(Conv2D(filters=64, kernel_size=2, activation='relu'))
model.add(MaxPooling2D(pool_size=2))
model.add(Dropout(0.2))
model.add(Conv2D(filters=128, kernel_size=2, activation='relu'))
model.add(MaxPooling2D(pool_size=2))
model.add(Dropout(0.2))
model.add(GlobalAveragePooling2D())
model.add(Dense(2, activation='softmax'))
```

CNN Model

Compile Model

```
model.compile(loss='categorical_crossentropy', metrics=['accuracy'], optimizer='adam')
```

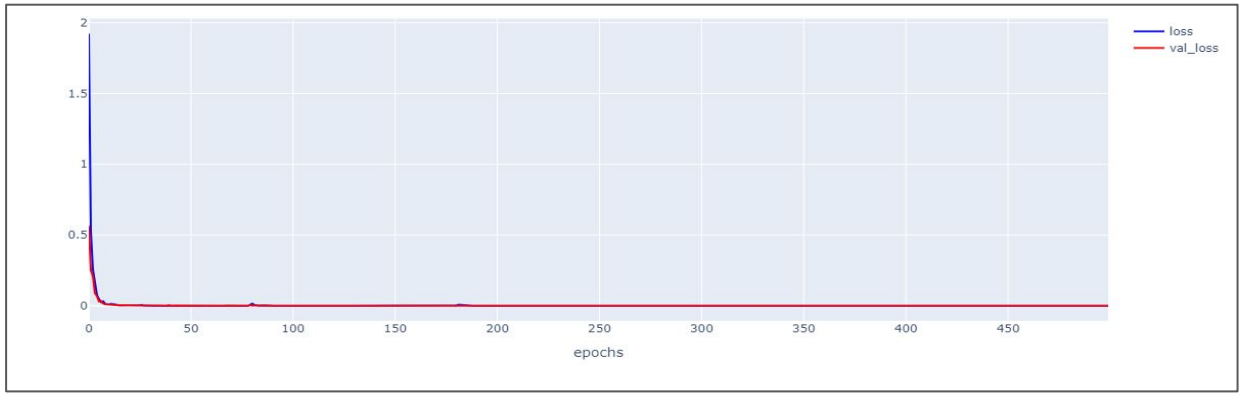
Train Model

```
his = model.fit(x_train, y_train, batch_size=64, epochs=500, verbose=1,
                validation_data = (x_val, y_val) )
```

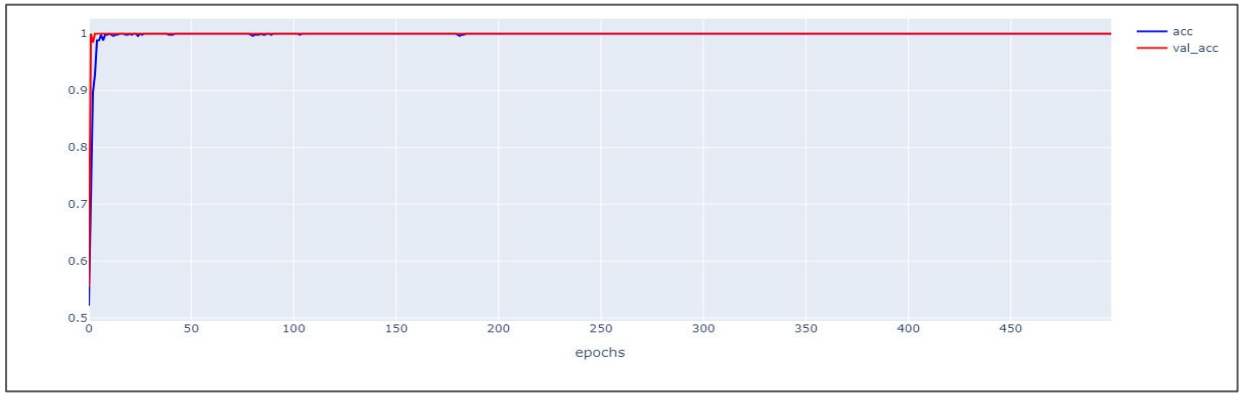
```
Epoch 494/500
8/8 [==============================] - 0s 39ms/step - loss: 2.5843e-07 - accuracy: 1.0000 - val_loss: 4.5728e-07 - val_accuracy: 1.0000
Epoch 495/500
8/8 [==============================] - 0s 40ms/step - loss: 2.3283e-07 - accuracy: 1.0000 - val_loss: 4.0699e-07 - val_accuracy: 1.0000
Epoch 496/500
8/8 [==============================] - 0s 38ms/step - loss: 9.1735e-08 - accuracy: 1.0000 - val_loss: 3.8743e-07 - val_accuracy: 1.0000
Epoch 497/500
8/8 [==============================] - 0s 37ms/step - loss: 2.0558e-07 - accuracy: 1.0000 - val_loss: 3.7718e-07 - val_accuracy: 1.0000
Epoch 498/500
8/8 [==============================] - 0s 38ms/step - loss: 5.8015e-07 - accuracy: 1.0000 - val_loss: 3.7811e-07 - val_accuracy: 1.0000
Epoch 499/500
8/8 [==============================] - 0s 36ms/step - loss: 7.6636e-07 - accuracy: 1.0000 - val_loss: 3.7066e-07 - val_accuracy: 1.0000
Epoch 500/500
8/8 [==============================] - 0s 38ms/step - loss: 6.3468e-06 - accuracy: 1.0000 - val_loss: 4.2934e-07 - val_accuracy: 1.0000
```

CNN Model

- Plot Loss

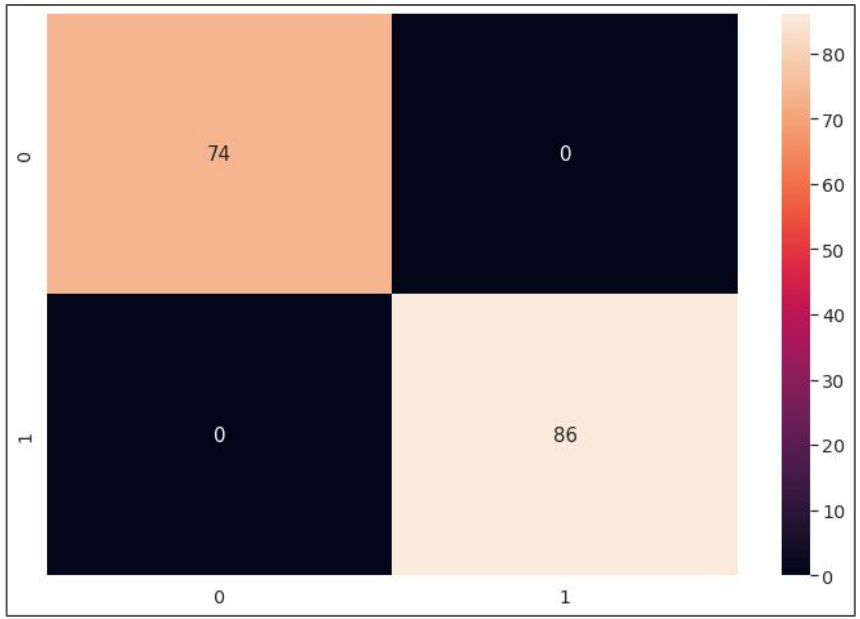


- Plot Accuracy



CNN Model

Confusion Matrix



Evaluate Model

```
Test Loss::  8.284786190415616e-07
Test Accuracy::  1.0
```

Classification Report

	precision	recall	f1-score	support
Happy	1.0000	1.0000	1.0000	74
Sad	1.0000	1.0000	1.0000	86
accuracy			1.0000	160
macro avg	1.0000	1.0000	1.0000	160
weighted avg	1.0000	1.0000	1.0000	160

Thank you!

Presented By

Group : Today is sunday

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