EMOTOR ML Model Documentation

Team KNOW

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1 Data

1.1 Data Collection

Dataset was provided in the problem statement and we used more training data from this link.

1.2 Pre-Processing

- Retrieved information for the seven emotions *angry, happy, sad, disgusted, neutral, fear,* and *surprise* from the training dataset.
- Used ImageDataGenerator function to get rescaled data.
- Also used the same function to flip the images horizontally, vertically to augment the data to improve th accuracy of the model.

Parameters used for training : *Images provided for training and also used the csv data in the form of numpy array of pixels in the images.*

2 Model Architecture

We created a web application using CNN Model to detect human facial emotions in real-time video. To detect emotions from image we used DeepFace Module in python, which used pre-trained model named VGG_Face network to analyse and predict emotion from human faces. Additionally, we have the MobilenetCuDNNLSTMv4 model, which has a decent training accuracy.

2.1 MobilenetCuDNNLSTMv4 Model

MobileNet is a streamlined architecture that uses depthwise separable convolutions to construct lightweight deep convolutional neural networks and provides an efficient model for mobile and embedded vision applications. The structure of MobileNet is based on depthwise separable filters, as shown in Figure1.

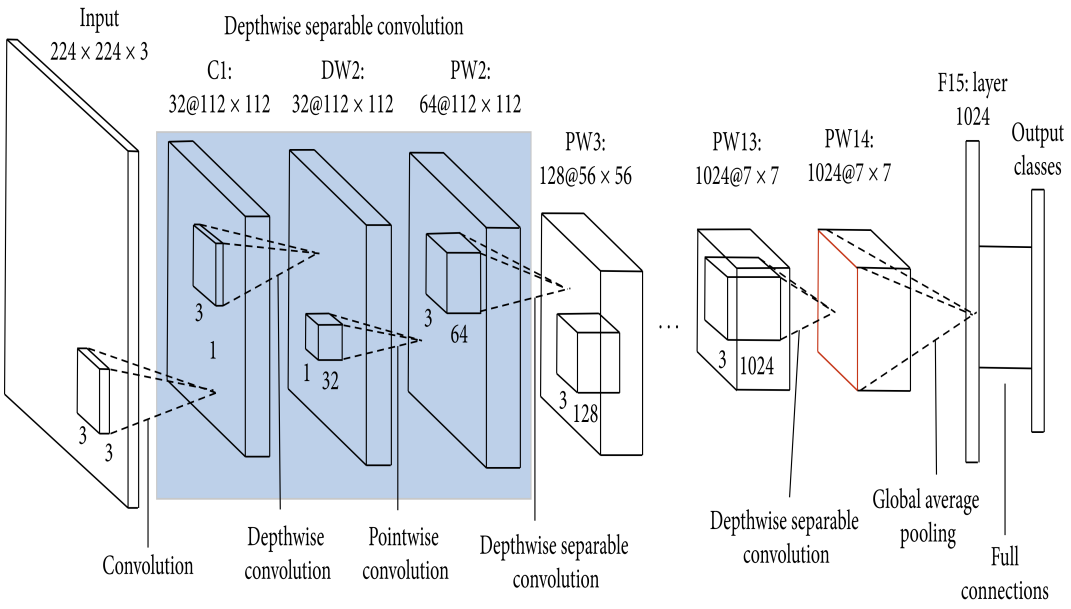

Figure 1: Architecture of Mobile Network model

2.2 CNN Model

Initially the data is normalized and max-pooling layer is added. Later the number of neurons are increased along with addition of drop-out layers to avoid over-fitting of the model, at the end Flatten and dense layer are also used to predict the output. The model is trained for 100 epochs initially and later on retraining the model to 110 epochs increased the F1-Score from 0.62 to 0.64 and training set accuracy.

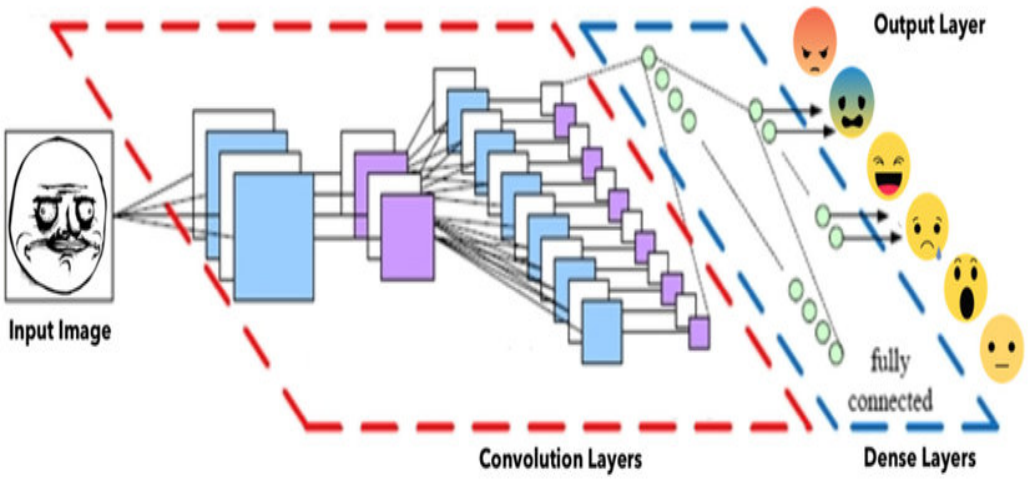

Figure 2: Architecture of CNN Model

3 Evaluation Metrics

3.1 MobilenetCuDNNLSTMv4 Model

3.1.1 Precision, Recall, F1-Score

Precision	0.2
Recall	0.18
F1 - Score	0.19

3.1.2 Confusion Matrix

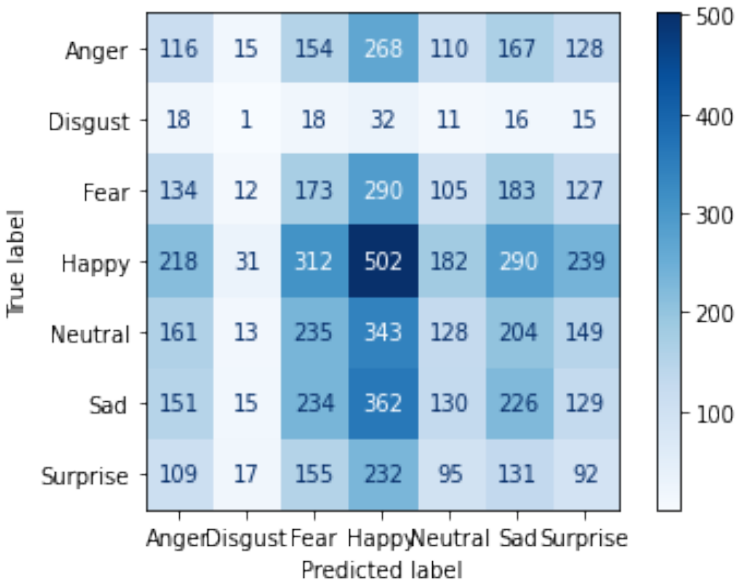

Figure 3: Confusion Matrix of mobilenetCuDNNLSTMv4

3.2 CNN Model

3.2.1 Precision, Recall, F1-Score

Precision	0.58
Recall	0.69
F1 - Score	0.63

3.2.2 Confusion Matrix

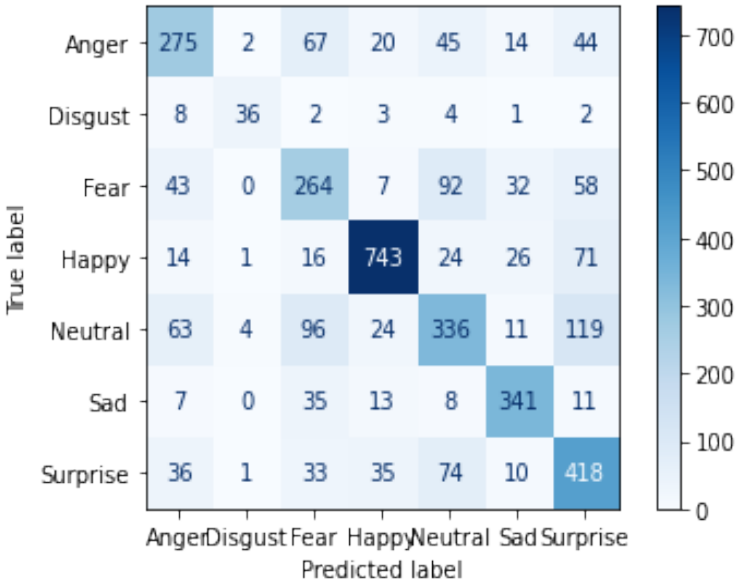

Figure 4: Confusion Matrix of CNN Model

4 Models tried

Model Name	Training Accuracy	Testing Accuracy
vgg19v2	36%	37%
CNNv2	47.00%	37.48%
mobilenetCuDNNLSTMv3	56.00%	49%
mobilenetCuDNNLSTMv2	68.54%	51.31%
mobilenetCuDNNLSTMv4	93.12%	57.41%
emotion model	88.55%	62.22%
CNN Model	88.44%	68.07%

Table 1: Models-Acuuracy

5 Limitations and Possible Enhancements

- If given more data, we may increase the model's accuracy because there are proportionally less photos in the surprise and disgust training data.
- The CNN model is of size 150MB due to training on many images and augmentation so we have uploaded it to drive if more time is given we could find a way to incorporate it in our web application.

6 Team Members

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