Capstone Project - 5

Face Emotion Recognition

Deep Learning

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Contents

Problem Statements

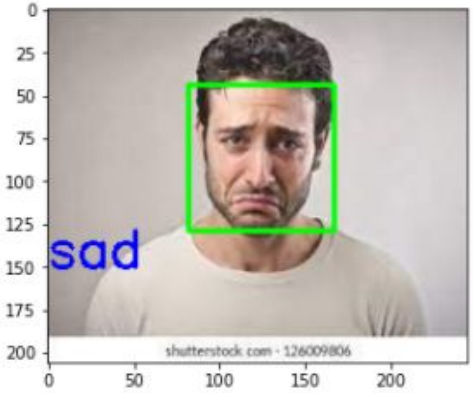
- Unable to identify students who need special attention .
- Lack of attention.
- Lack of surveillance .

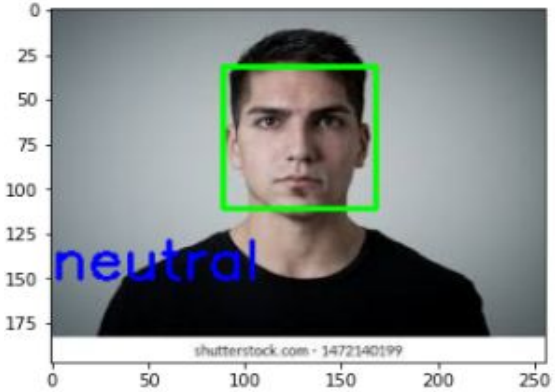
Data Summary

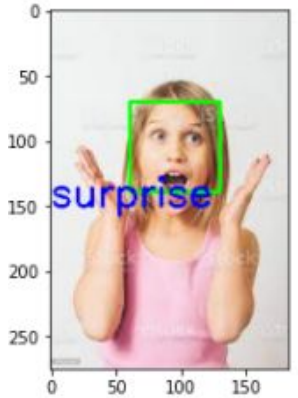
- DeepFace Model : FER 2013 dataset
- FER Model : FER 2013 dataset
- Transfer Learning model : FER-13 Cleaned dataset
- CNN Model : Face expression recognition dataset

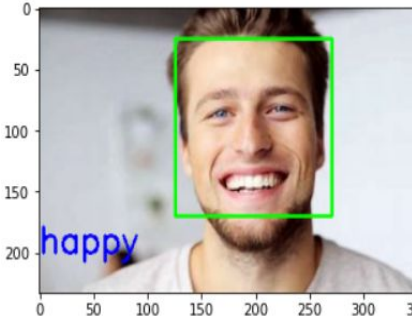
- AaAAn

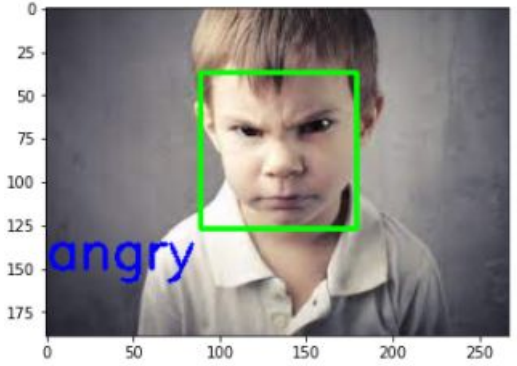
Pre-Trained Models Predictions



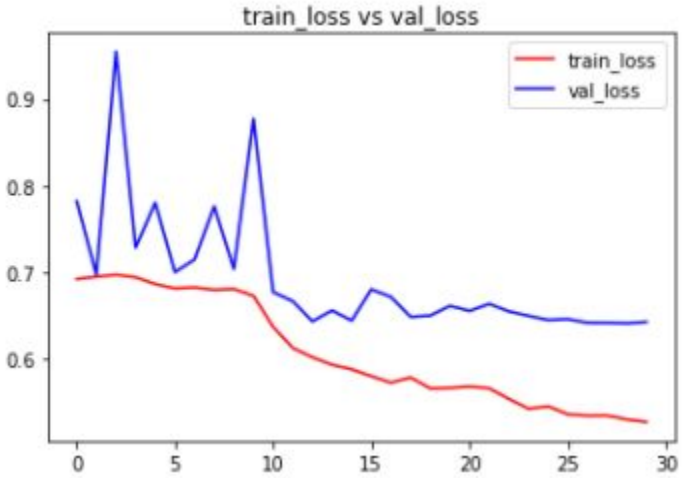


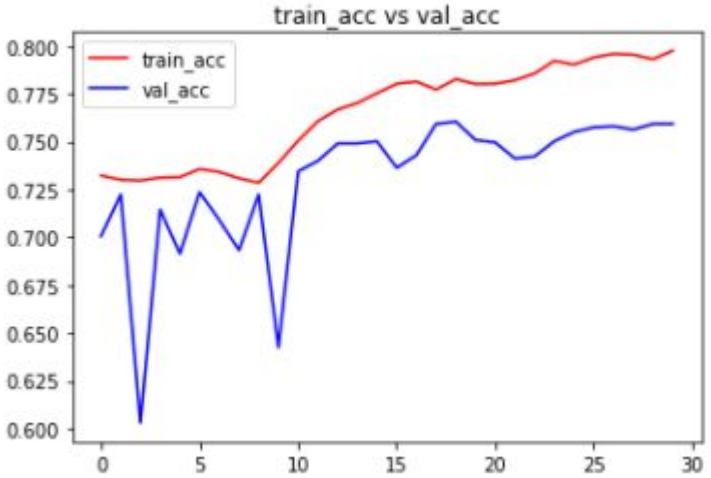






Transfer Learning Model

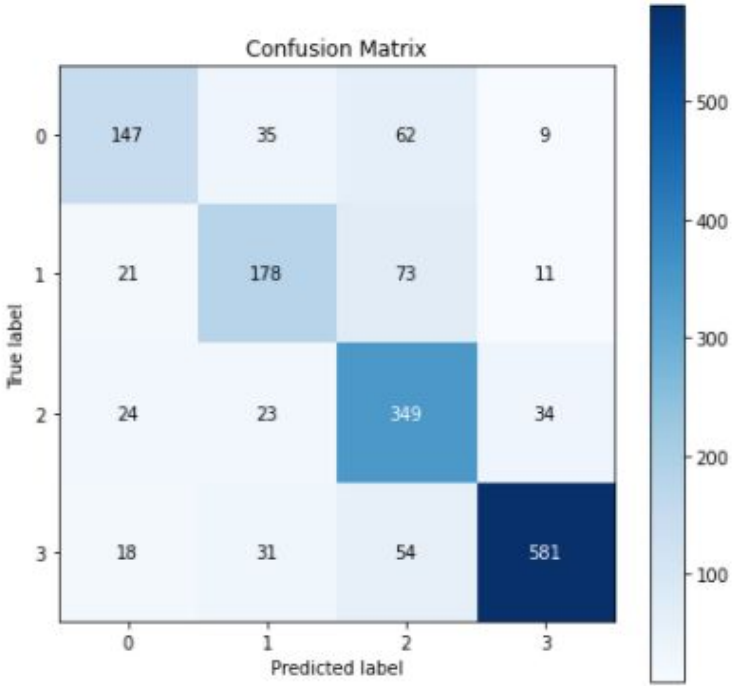




Parameters of Model

- Epoch : 40
- Batch size : 25
- Activation function : Softmax
- NAdam : learning rate - 0.001, beta_1 - 0.9, beta_2 - 0.999, epsilon - 1e-07 .
- Adam : learning rate - 0.01

Transfer Learning Model Evaluation

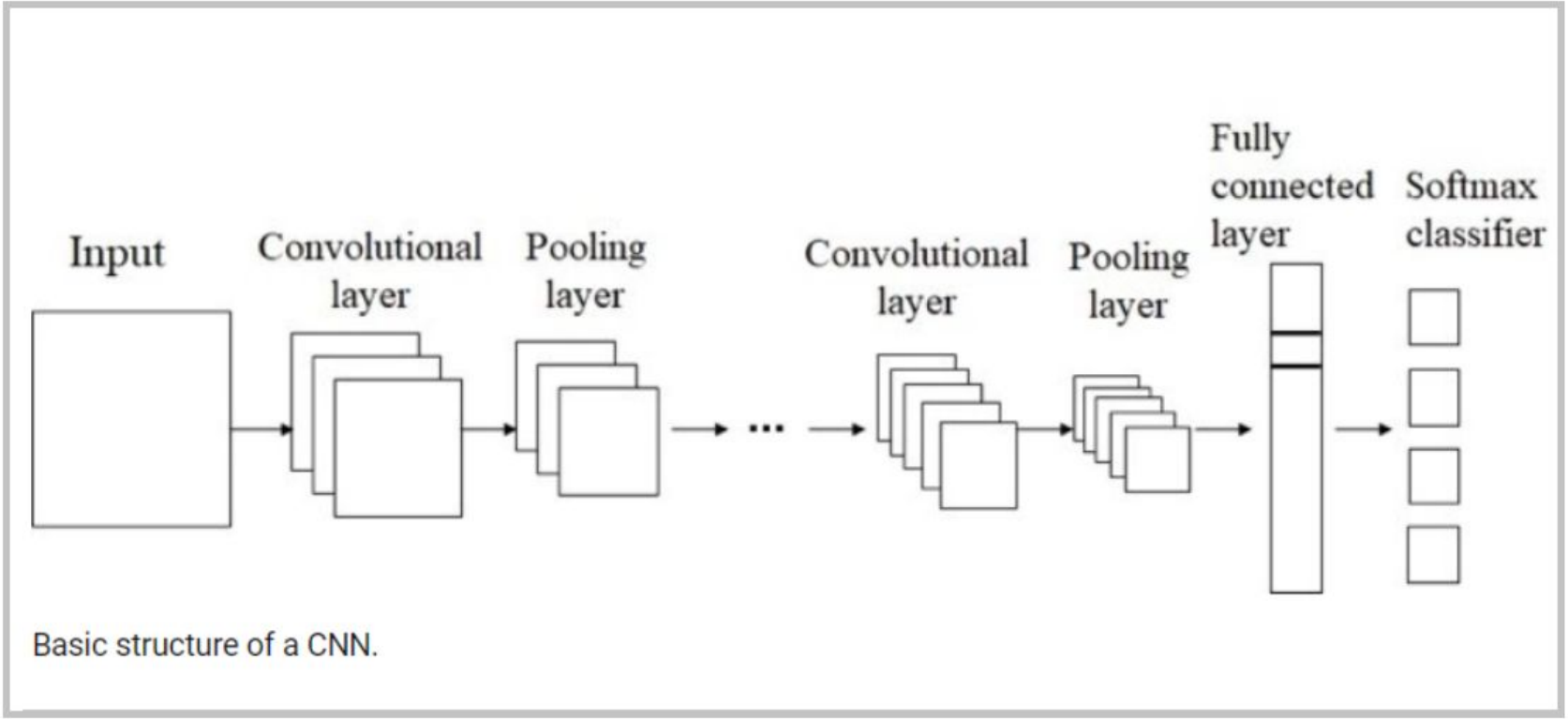



```
Test Loss: 0.6500301957130432
Test accuracy: 0.760606050491333
(1, 48, 48, 3)
Train Loss: 0.5202629566192627
Train accuracy: 0.8004849553108215
(1, 48, 48, 3)
```

Test Data

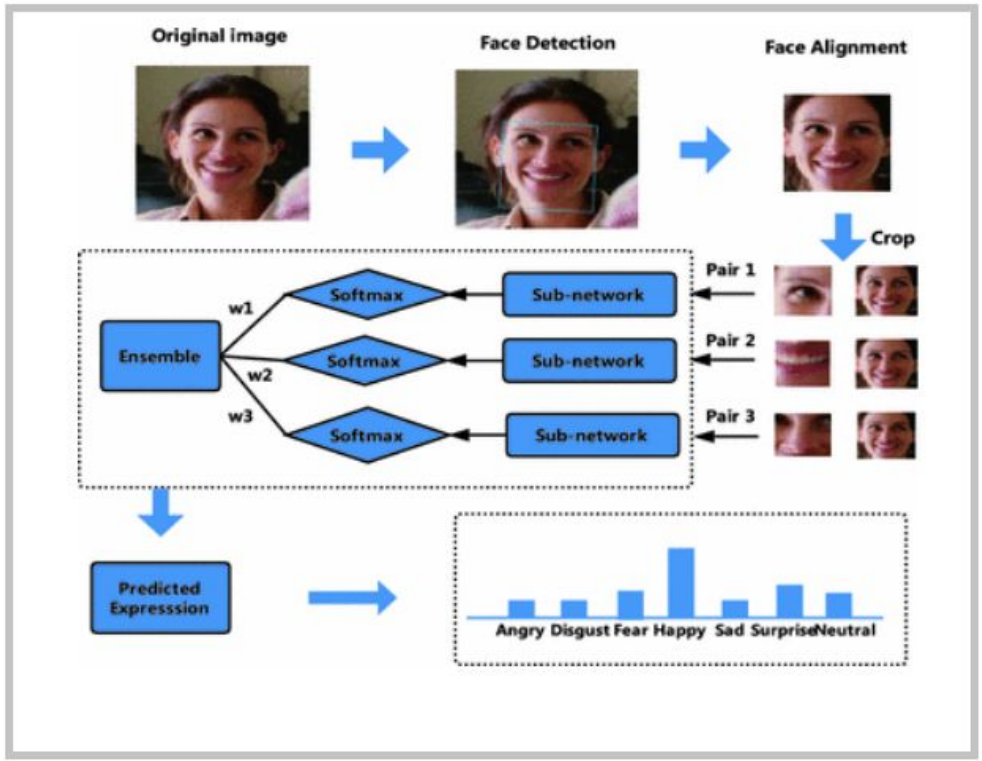
	precision	recall	f1-score	support
0	0.70	0.58	0.63	253
1	0.67	0.63	0.65	283
2	0.65	0.81	0.72	430
3	0.91	0.85	0.88	684
accuracy			0.76	1650
macro avg	0.73	0.72	0.72	1650
weighted avg	0.77	0.76	0.76	1650

CNN Model

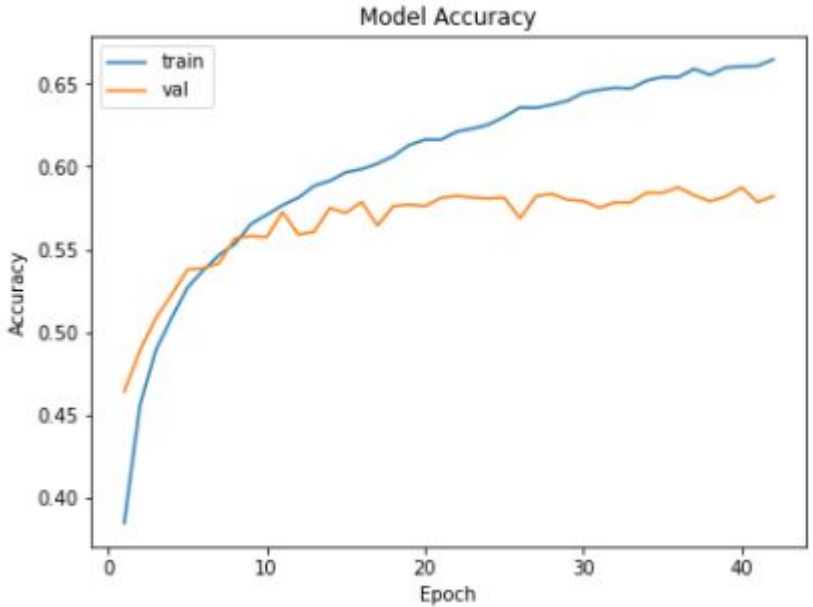


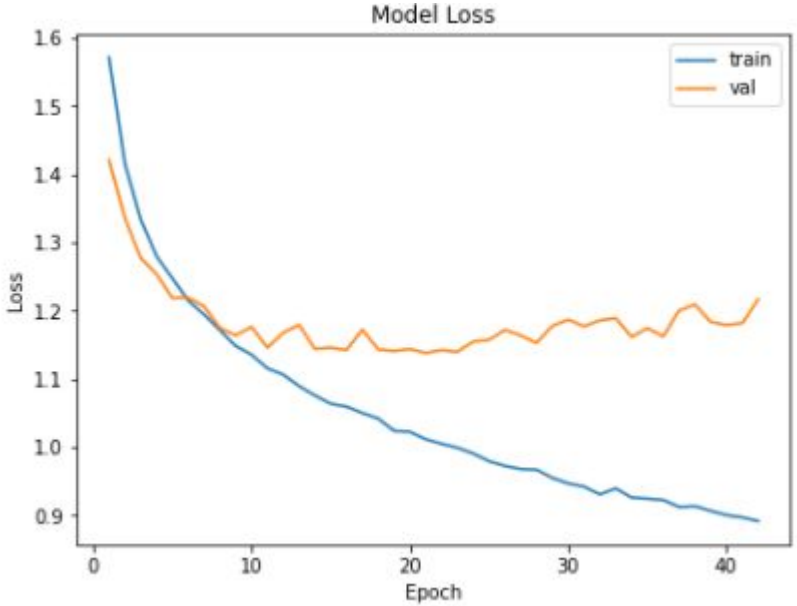
Basic structure of a CNN.

CNN Model


Original image
Face Detection
Face Alignment
Crop
Pair 1
Pair 2
Pair 3
Sub-network
Sub-network
Sub-network
Softmax
Softmax
Softmax
w1
w2
w3
Ensemble
Predicted Expresssion
Angry Disgust Fear Happy Sad Surprise Neutral

CNN Model Evaluation





CNN Model Parameters

- Activation Function - ReLu, Softmax
- Epoch - 42
- Optimizer - Adam
- Hidden layers - 3
- Batch size -32

Challenges

- Working on pre trained models
- Training the model
- Writing a code to access webcam using opencv
- Deployment part

Video Demonstration

Conclusion

- It is capable to predict almost every kind of faces whatever be the ethnicity or races of the individual it will tackle all.
- Our model is robust to variation in lightning i.e. works even in the dim environment accurately.
- There is no need to put special make-up or do any other kind of adjustments to detect faces or to detect emotions, we just only need to allign our faces beneath the camera.
- The model will detect faces automatically and will calculate facial expression based on the data of the faces whether their is a rigid motion in the data it’s capable of adjusting all automatically.

Future Scope

- Patient Monitoring in hospitals to judge the effectiveness of prescribed drugs is one application to the Health Sector.

- Diagnosis of diseases that alter facial features and psychoanalysis of patient mental state are further possibilities.

- Recognition of more facial expressions by adding more “expression units” of individual.

Thank You