FACIAL EMOTION RECOGNITION

By Abdullah & Abdulrahman

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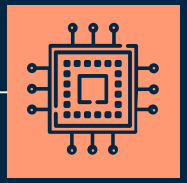


02

MODELS

- Baseline model
- Simple NN, NN
- Simple CNN, CNN

03

CONCLUSION

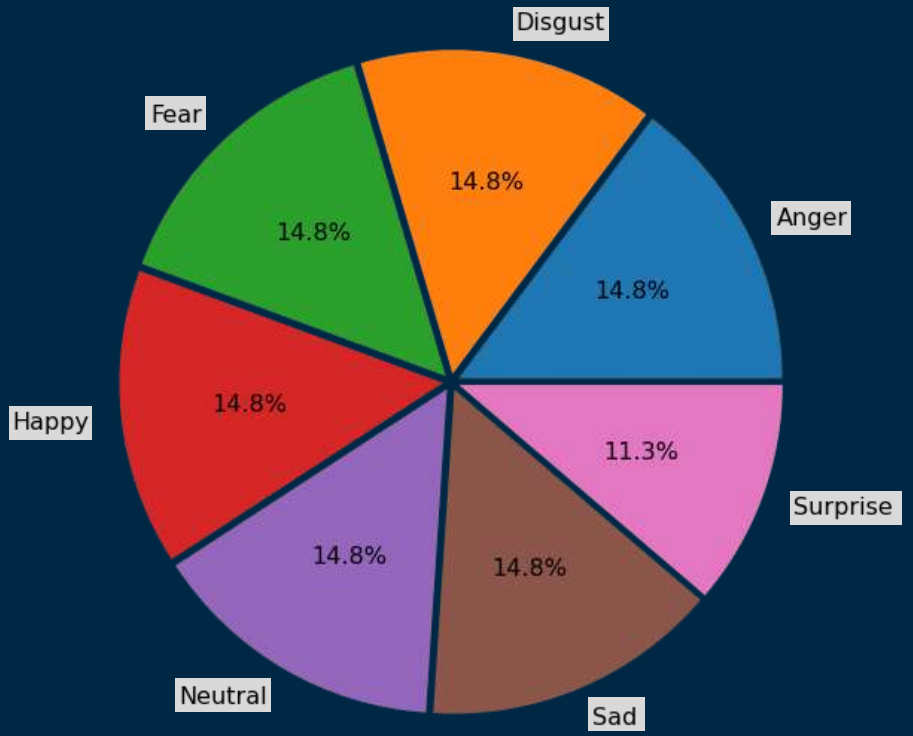
- Final model

BACKSTORY

- Humans are capable of conveying many emotions through their faces.
- Emotion recognition is the process of identifying human emotion.
- Technology can be used to recognize these emotions.

DATASET

- Facial Emotion Recognition.
- From Kaggle.
- 37,303
- Multilabel:
  - Neutral
  - Happy
  - Sad
  - Surprise
  - Fear
  - Disgust
  - Anger
- Colored
- Balanced
- Different sizes

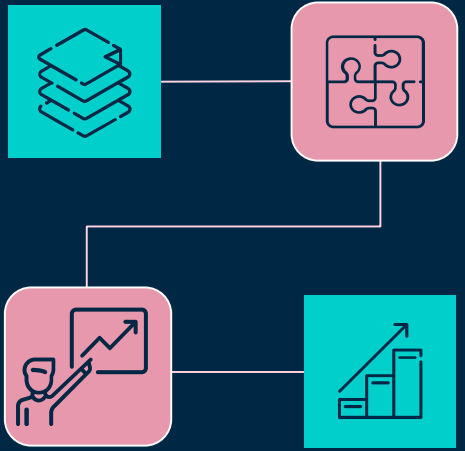


TOOLS

PROJECT WORKFLOW

DATA READING

Reading images using TensorFlow



DATA AUGMENTATION

Resize images
Scaling
Flip images
Rotate Images

BASELINE MODELS

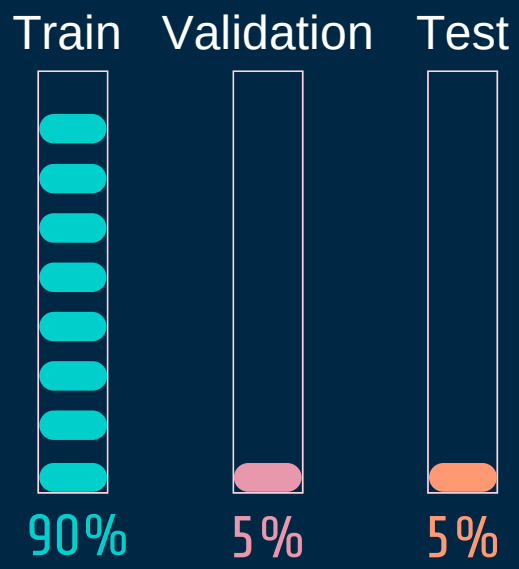
Sample images.
Data classes graph.

MODELS

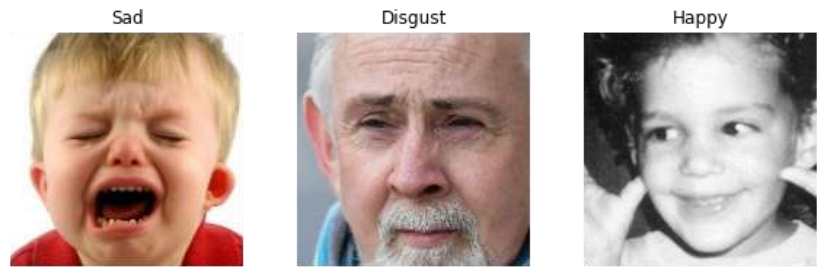
CNN Model
Transfer Learning

DATA AUGMENTATION

- Resize Images (180x180)
- Scaling/Normalization (1 to 255)
- Randomly Rotate Images (up to 20°)
- Randomly Flip Images (Horizontally)



DATA SAMPLE



BASELINE MODELS

1

Simple NN

- Hidden layers: 1
- Dense: 16
- Activation: ReLU
- Optimizer: ADAM, SGD

2

NN

- Hidden layers: 7
- Dense: 8 - 64 - 8
- Activation: ReLU, tanh
- Optimizer: ADAM, SGD

3

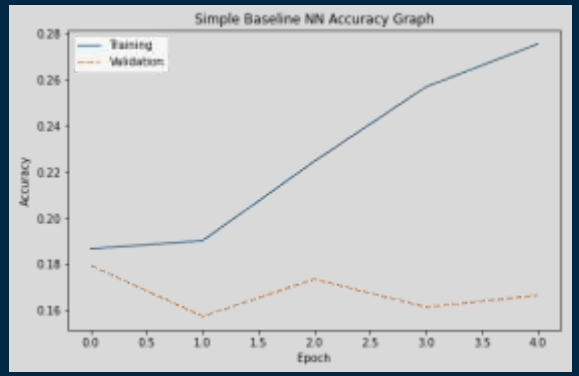
Simple CNN

- Hidden layers: 2
- Filters: 20 , 10
- Activation: ReLU, tanh
- Padding: Same
- Optimizer: ADAM, SGD

- Loss function: Sparse Categorical Crossentropy
- Output Activation: SoftMax

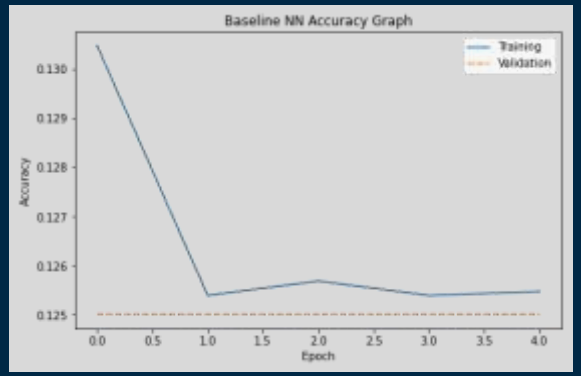
BASELINE MODEL GRAPHS

Simple NN



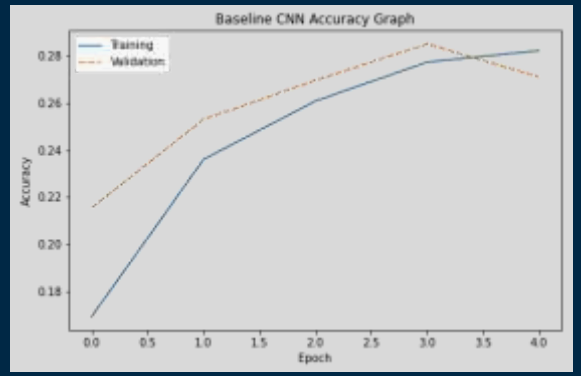
- Train Accuracy: 30.89%
- Validation Accuracy: 16.65%
- Difference: 14.24

Neural Network



- Train Accuracy: 13.31%
- Validation Accuracy: 12.5%
- Difference: 0.81

Simple CNN



- Train Accuracy: 29.36%
- Validation Accuracy: 27.09%
- Difference: 2.26

MAIN MODELS

CNN

- Hidden layers : 7
- Filters : 32-64-128-256
- Strides : 2
- Kernel Size : 3
- Kernel Regularize : L2()
- Spatial Dropout : 0.4
- BatchNormalization
- Activation : ReLU , tanh.
- Padding : Same
- Optimizer : adam , SGD

DenseNet

- Layers added : 2
- Dense : 256 - 128
- BatchNormalization
- Activation : ReLU .
- Optimizer : adam
- Weights : imagenet
- Include Top : False

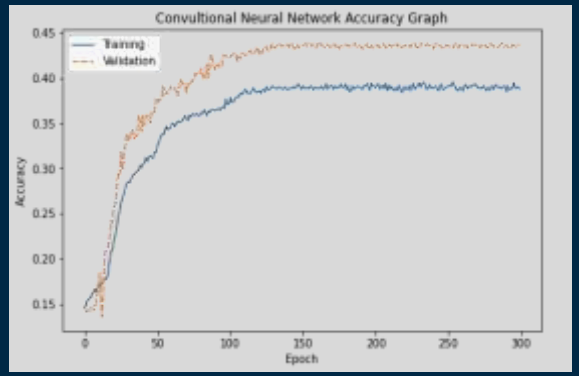
VGG-16

- Layers added : 2
- Dense : 256 - 256
- BatchNormalization
- Activation : ReLU.
- Optimizer : adam
- Weights : imagenet
- Include Top : False

- Loss function: Sparse Categorical Crossentropy
- Output Activation: SoftMax

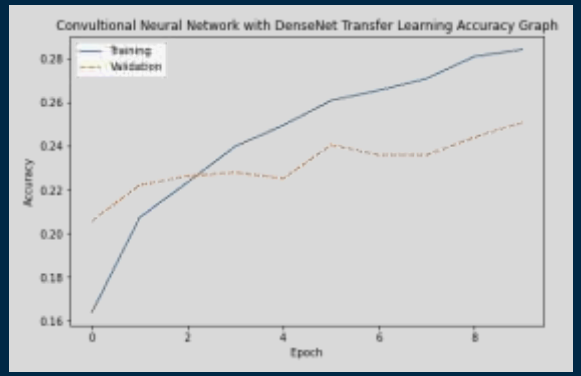
MAIN MODEL GRAPHS

CNN



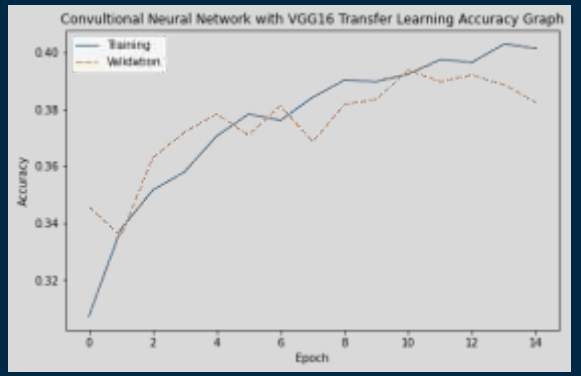
- Train Accuracy: 45.44%
- Validation Accuracy: 43.65%
- Difference: 1.78

DenseNet



- Train Accuracy: 29.92%
- Validation Accuracy: 25.08%
- Difference: 4.84

VGG-16



- Train Accuracy: 42.00%
- Validation Accuracy: 38.22%
- Difference : 3.77

MAIN MODELS

VGG-19

- Layers added : 2
- Last two layers are trainable
- Dense : 256 – 256
- GlobalAveragePooling2D()
- BatchNormalization
- Activation : ReLU.
- Optimizer : adam
- Weights : imagenet
- Include Top : False

InceptionV3

- Layers added : 2
- Last layer is trainable
- Dense : 256 – 256
- GlobalAveragePooling2D()
- BatchNormalization
- Activation : ReLU .
- Optimizer : adam
- Weights : imagenet
- Include Top : False

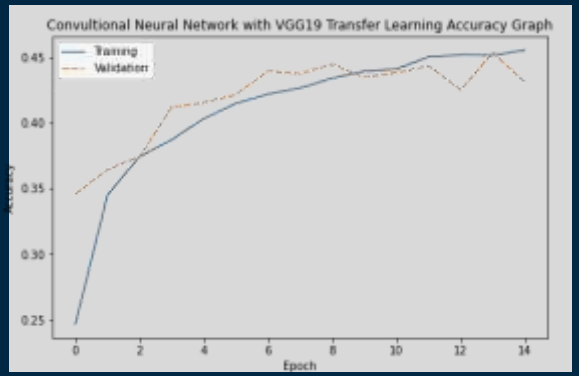
ResNet50

- Layers added : 2
- Last layer is trainable
- Dense : 512 – 256
- GlobalAveragePooling2D()
- BatchNormalization
- Activation : ReLU.
- Optimizer : adam
- Weights : imagenet
- Include Top : False

- Loss function: Sparse Categorical Crossentropy
- Output Activation: SoftMax

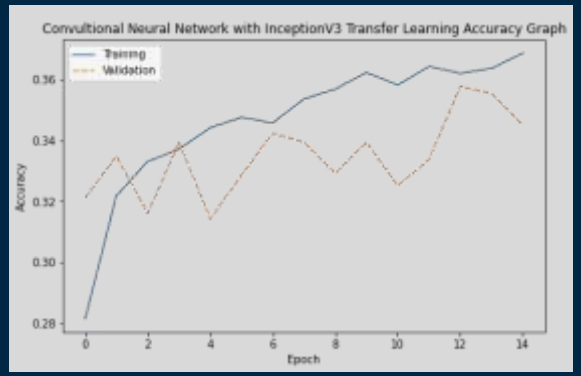
MAIN MODEL GRAPHS

VGG-19



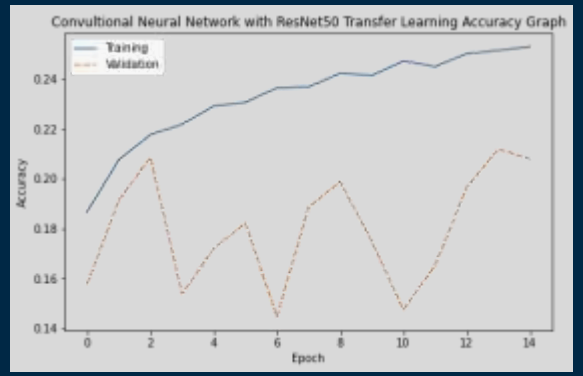
- Train Accuracy: 47.81%
- Validation Accuracy: 43.08%
- Difference: 4.72

InceptionV3



- Train Accuracy: 38.08%
- Validation Accuracy: 34.51%
- Difference: 3.57

ResNet50



- Train Accuracy: 18.51%
- Validation Accuracy: 20.80%
- Difference: 2.28

CONCLUSION

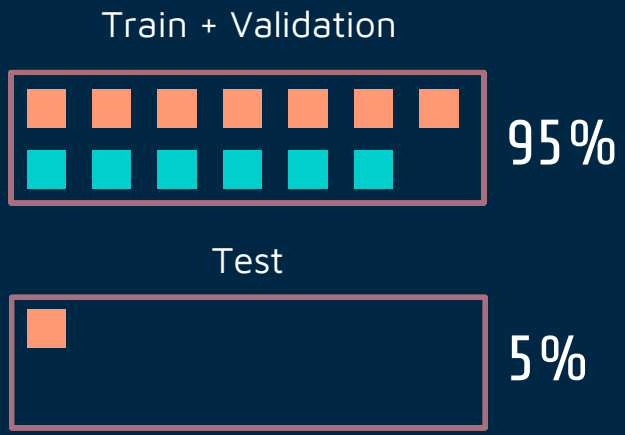
Final Model

VGG19 Transfer Learning

- Layers added: 5
- Last two layers are trainable
- Dense: 128 – 128
- GlobalAveragePooling2D
- Dropout
- Activation: ReLU.
- Optimizer: ADAM
- Weights: imagenet
- Include Top: False
- Train Accuracy: 48.52%
- Test Accuracy: 45.14%

Future Work

- Improve model accuracy by tuning Neural Network



THANKS FOR LISTENING