Emotion Detection with CNNs

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Overview

- Background
- Problem Statement
- Data Acquisition
- Baseline
- Preprocessing
- Model Characteristics
- Model Performance
- Conclusions/Recommendations

Background

- Image Recognition
- Detecting Facial Features
- Convolutional Neural Networks

Problem Statement

- Construct a model predicting human emotions by detecting facial expressions in images.
- Binary Classification of “happy” and “neutral”
- Emphasis on diversity

Data Acquisition

- Image source
  - UTKFace online database of human faces
  - 20,000 images of people aged 0 to 116
  - Labeled by us.




BASELINE MODEL

Baseline - 50%

1000 happy faces

1000 neutral faces

PREPROCESSING

Data Augmentation

Train-Validation Split

- 10,727 training set
- 1893 test set

Rescaling

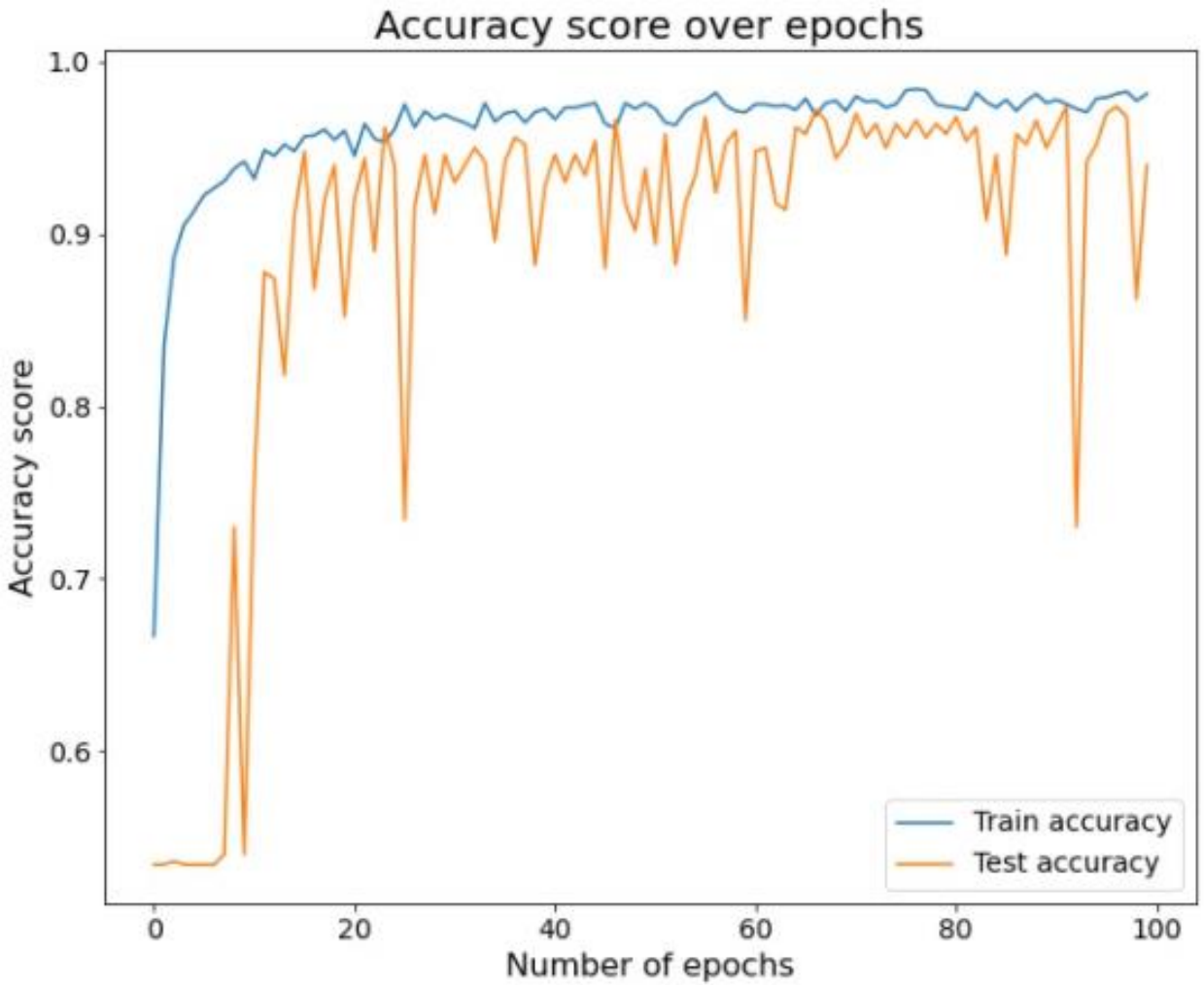
Model Characteristics

Layer	Activation	Normalization	Regularization
Conv2D (2)	ReLU	Batch	L2
SeparableConv2D	ReLU	Batch	L2
MaxPooling2D	-	-	-
SeparableConv2D	ReLU	Batch	L2
GlobalAveragePooling	-	-	-
Dense Output	Sigmoid	-	-

MODEL PERFORMANCE

Adjustments

- Learning Rate
- Epochs
- Layers



MODEL PERFORMANCE

Baseline 50%

Training Data 98.8%

Validation Data 97.2%

Test Data 95.5%

MODEL PERFORMANCE

Race:

Asian - 95.0%

Dark Complexion- 90.0%

White – 96.6%

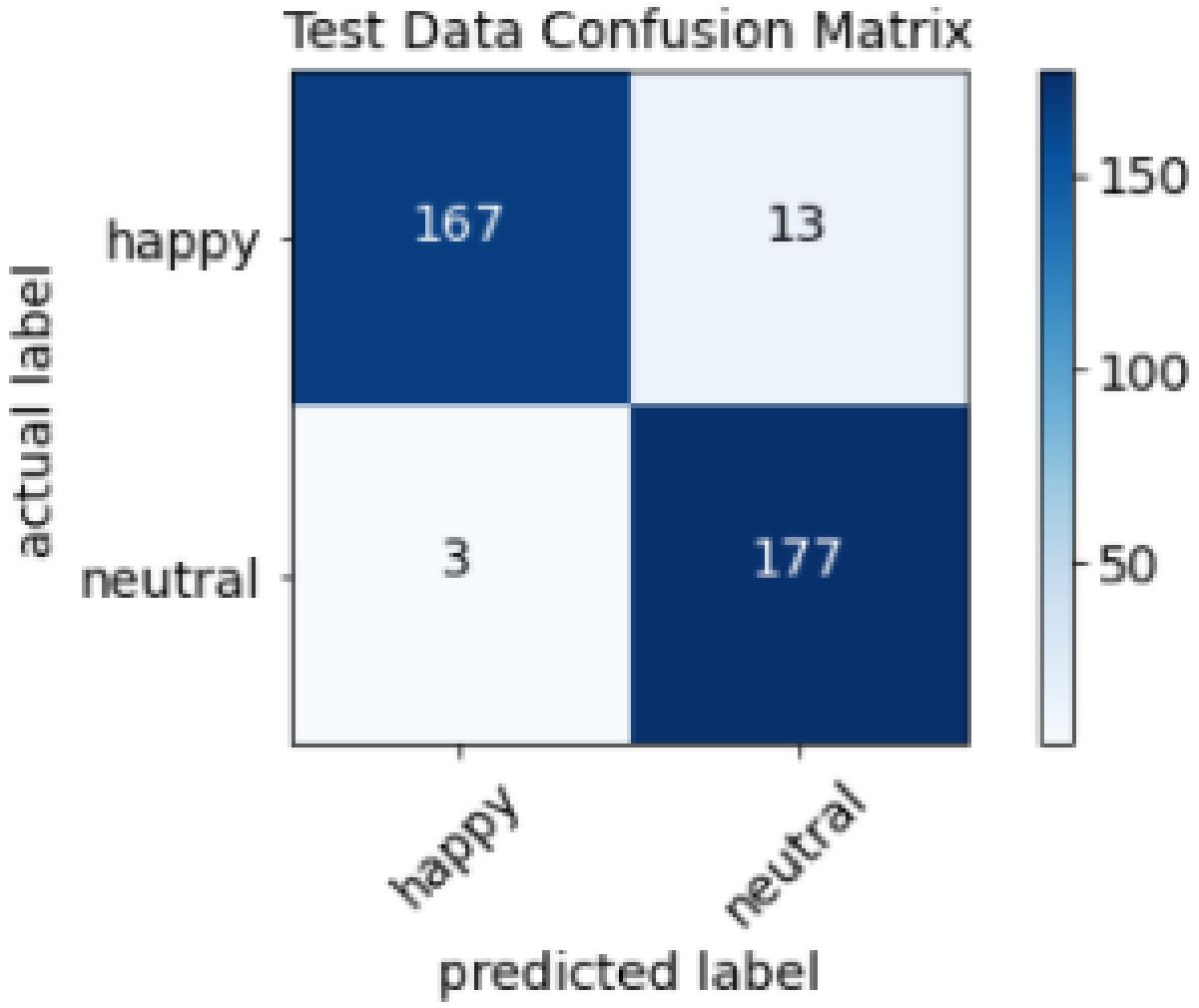
Age:

Elderly – 84.4%

Adults – 98.8%

Children – 96.7%

Babies – 95.5%



Conclusions/Recommendations

- Slightly Overfit 98.8% train vs. 97.2% validation
- Building block for further implementation
- Pretrained model
- Additional layers