FACIAL EMOTION RECOGNITION

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Capstone Project - Milestone II

MILESTONE 2

1

REFINED INSIGHTS

2

TECHNIQUES AND PERFORMANCE

3

FINAL SOLUTION

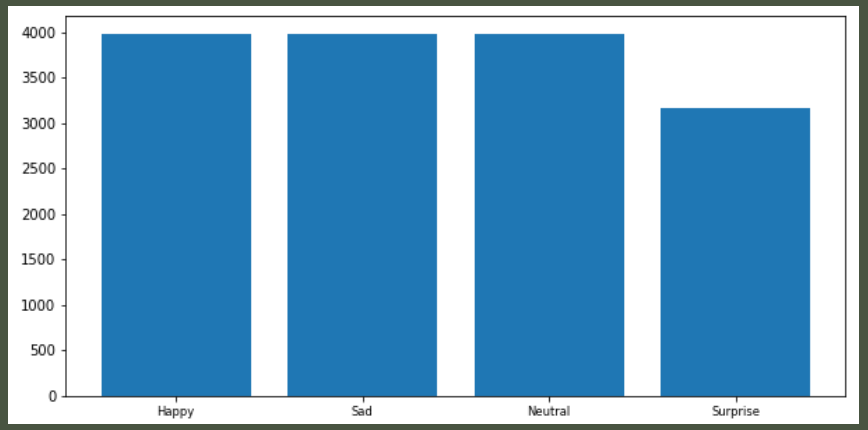
REFINED INSIGHTS

Objective: Multiclassification problem
4 classes: happy, sad, neutral, surprised.

Unbalanced dataset for “surprised” class.
Using data generators for data augmentation (solution).

20K images – 75/25 train-validation split

Possible solutions: ANN, CNN + Transfer Learning



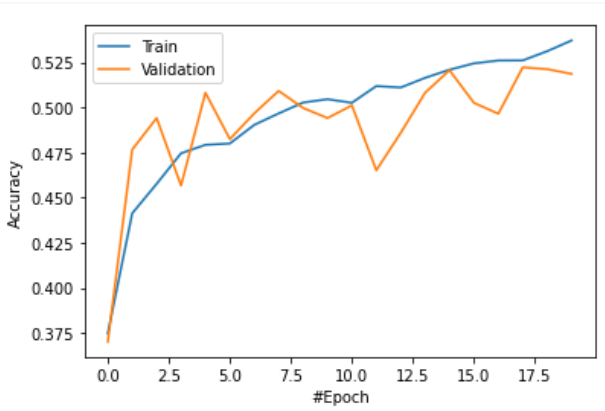
TECHNIQUES AND PERFORMANCE

VGG16

Trainable parameters: 14,7M
Using block5_pool as starting point.

Slightly overfitted - use less epochs

Train accuracy: 54%
Validation accuracy: 51%
Performance can be improved.

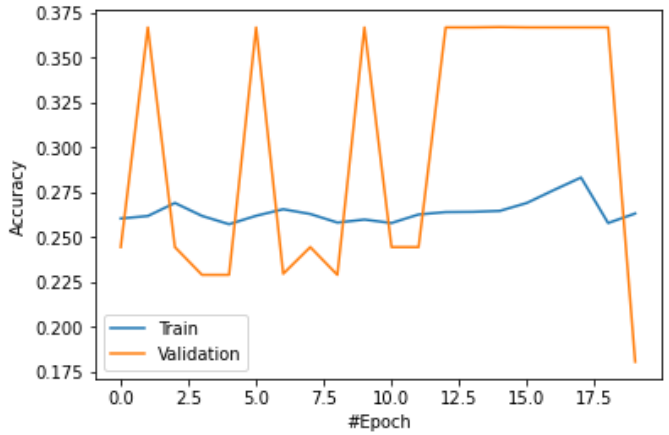


RESNET

Much more complex model:
#Parameters: 42,7M (trainable 42,5M)
Using *conv5_block3_add* as starting point.

Validation accuracy unstable and training accuracy not improving.
Train accuracy: 26%
Validation accuracy: 18%

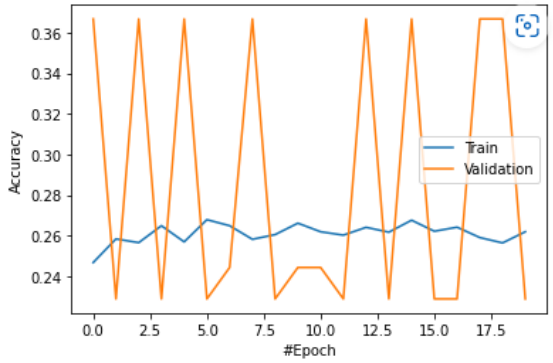
High uncertainty: validation accuracy goes up and down.



EFFICIENTNET

Least complex LT model used:
#Parameters: 8,8M (trainable 8,7M)

Similar to ResNet - High uncertainty: validation accuracy goes up and down.



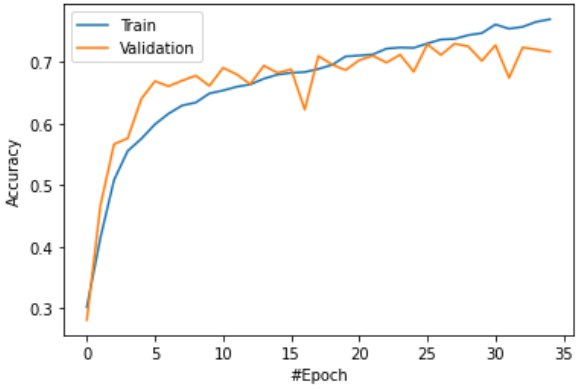
COMPLEX NN

CNN instead of ANN.
Complex ANN - #Parameters high: 1,7M

Uses GrayScale instead of 3 input channels.

Best model.

Training accuracy 76%
Validation accuracy: 71%
Slightly overfitted.



FINAL SOLUTION

COMPLEX NN

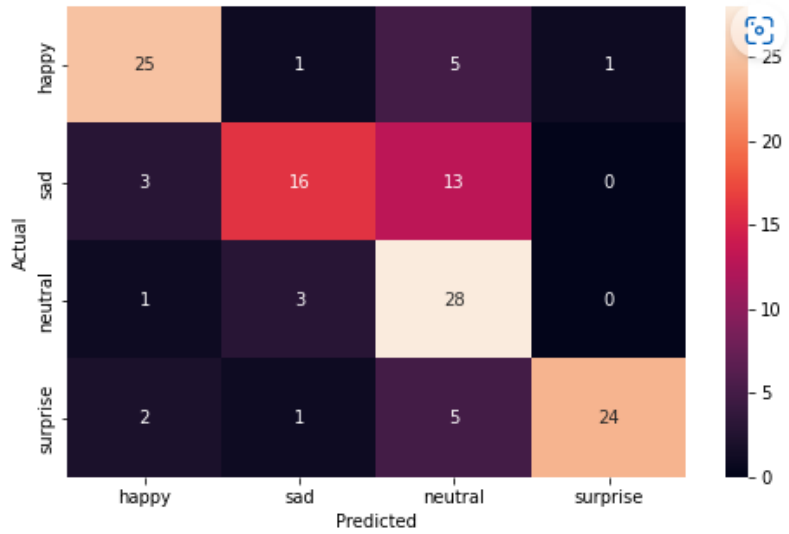
CNN instead of ANN.
Complex ANN - #Parameters high: 1,7M
(much less parameters than CNN)
Uses GrayScale instead of 3 input channels.

Testing accuracy: 71-76%

- Surprised and happy images are far much better recognized compared to sad and neutral emotions.
- Most common error: sad faces that are classified as neutral emotion.
- Neutral class has high recall and low precision meaning neutral faces are very good identified, but many sad faces are mistaken as neutral (false positives).

Found 128 images belonging to 4 classes.

	precision	recall	f1-score	support
0	0.81	0.78	0.79	32
1	0.76	0.50	0.60	32
2	0.55	0.88	0.67	32
3	0.96	0.75	0.84	32
accuracy			0.73	128
macro avg	0.77	0.73	0.73	128
weighted avg	0.77	0.73	0.73	128



Found 128 images belonging to 4 classes.

	precision	recall	f1-score	support
0	0.77	0.84	0.81	32
1	0.71	0.53	0.61	32
2	0.57	0.75	0.65	32
3	1.00	0.84	0.92	32
accuracy			0.74	128
macro avg	0.76	0.74	0.74	128
weighted avg	0.76	0.74	0.74	128