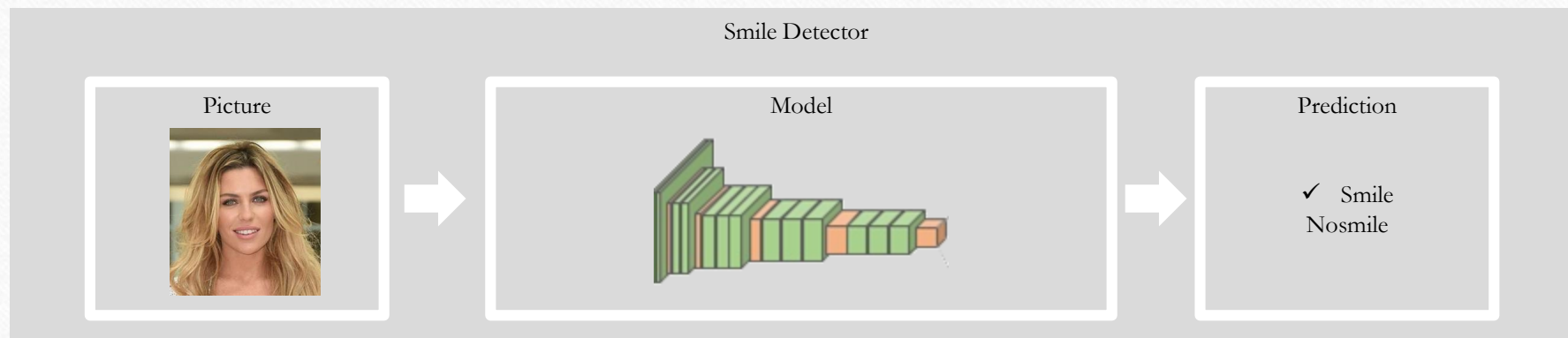# Smile Recognition

Comparision between different Models and Architectures by Joanna Gontarek
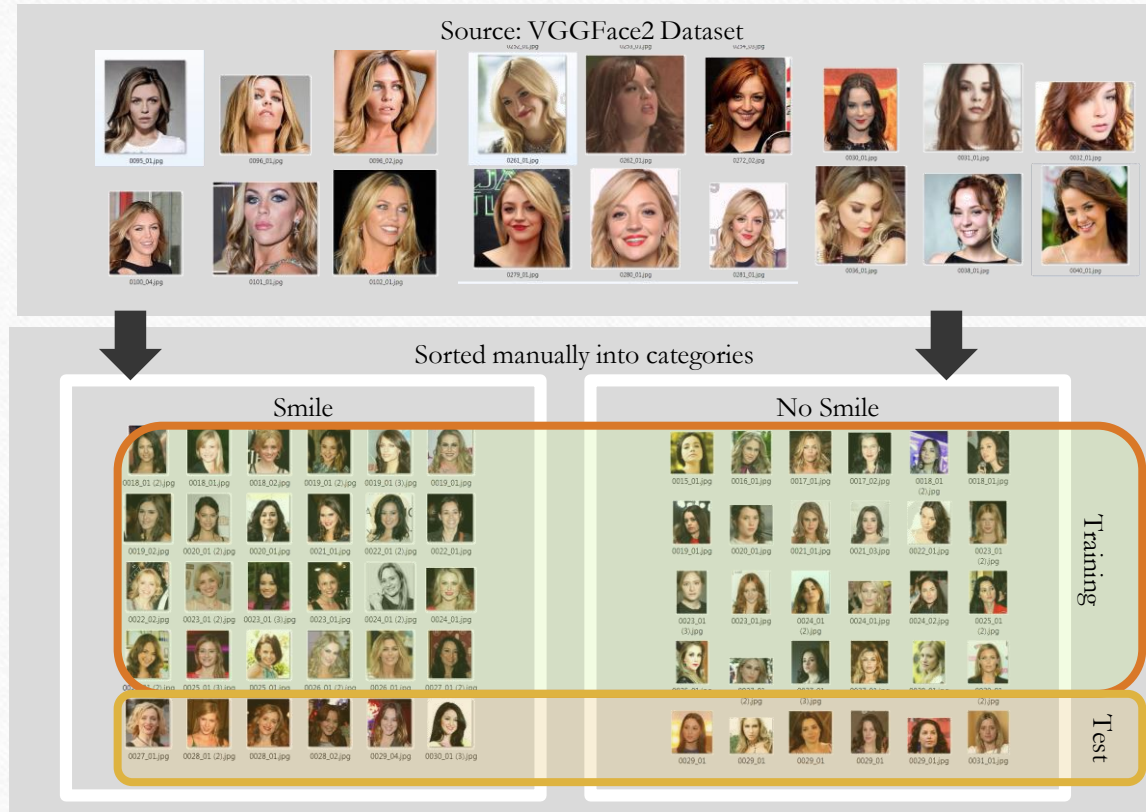
Agenda

- Task

- Training Dataset

- Models and Architecture

- Training Settings

- Results

We allow a person to enter the house only if he/she is smiling! So, a smile detector!

Smile Detector

Picture	Model	Prediction
		✓ Smile Nosmile

Training Dataset

⇒ Using VGG-Faces Dataset,
no need to extract bounding boxes

⇒ Manually sorted pictures
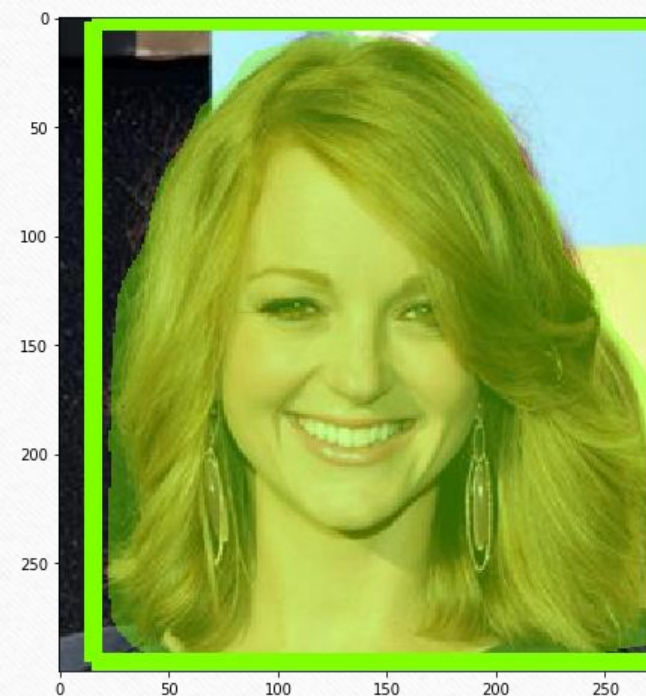into smiling / not smiling

⇒ Balanced dataset: Same number of smiling /
not smiling pictures for each person

⇒ 700 Training Images
(350 Smile, 350 Nosmile)

⇒ 100 Test/Validation Images
(50 Smile, 50 Nosmile)

The images in this dataset are already cropped to the bounding boxes around the faces, therefore, I don't have to crop them
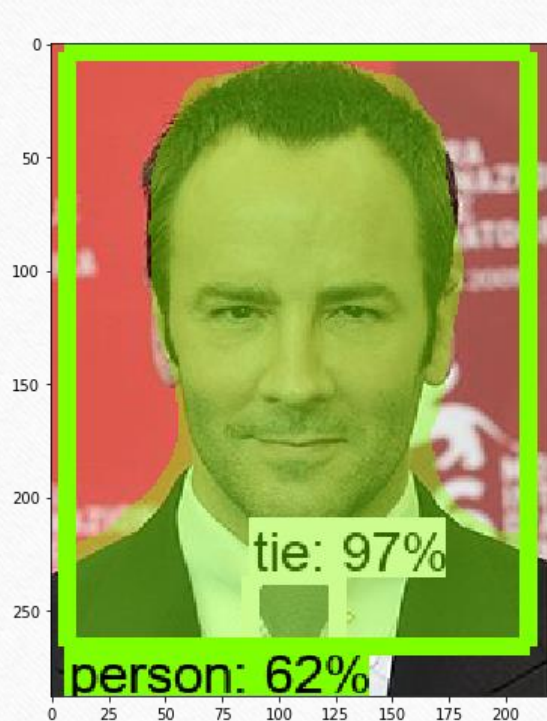
tie: 97%

person: 62%

-

The Dataset can be extended in Keras via Image Augmentation by generating varied images from the training dataset
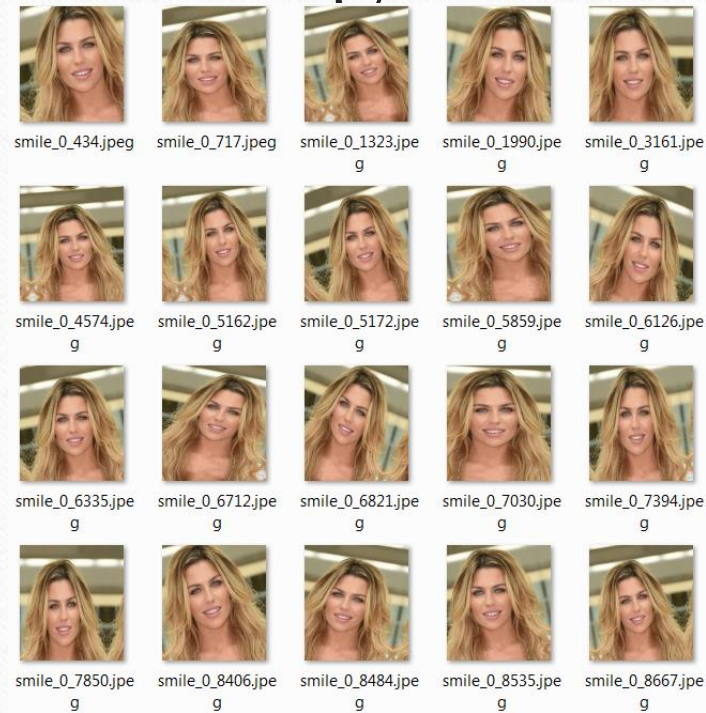
Mask RCNN Inception vs Mask RCNN Inception Resnet

mask_rcnn_inception

Only these deep CNNs can be used for this task

I reuse inception v3 and Inception resnet v2 for this task

mask_rcnn_inception_resnet
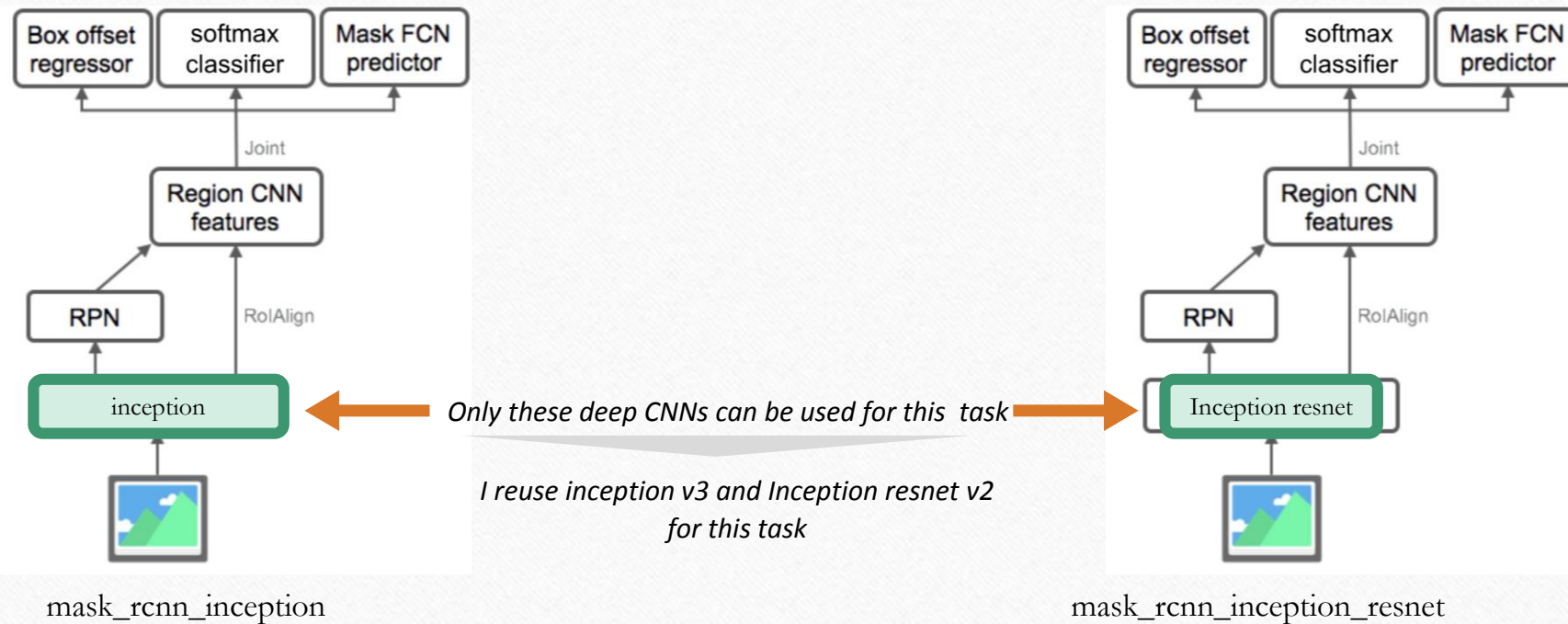
General Mask RCNN Architecture
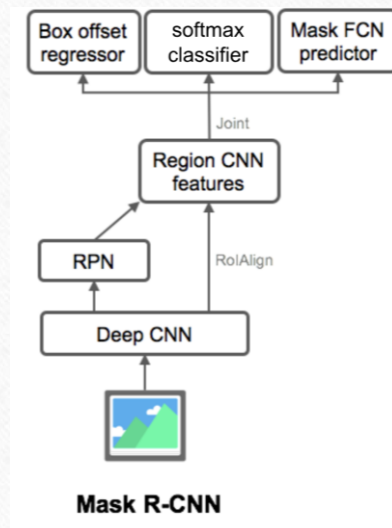
I have to build a new classifier, because the pretrained classifiers don't distinguish between smile and nosmile.
Therefore, I have to build a new classifier

I can reuse pretrained deep CNNs for feature detection and extraction

Network Architectures
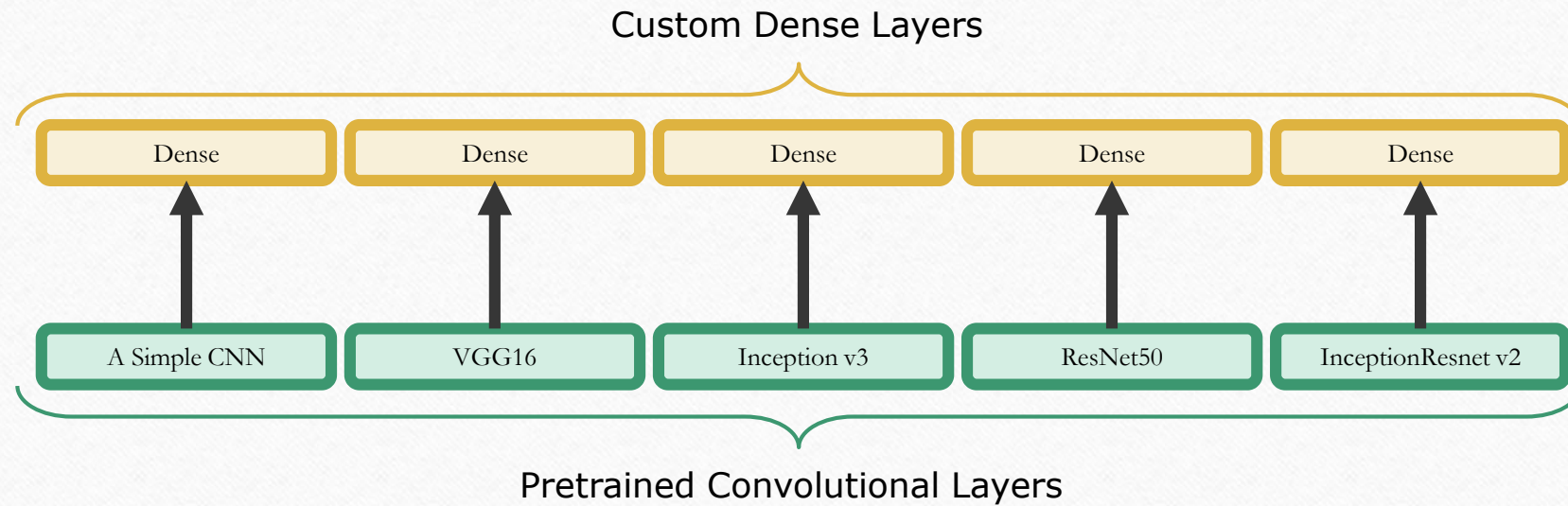
Training Settings

- Training Images: 700
- Validation Images: 100
- Image dimensions: 3, 150, 150 (Channel first)

- Image Preprocessing: Keras Generators

- Epochs: 30
- Batch Size: 10
- Callbacks: Early Stopping and Checkpoint saving (depending on validation loss)
- Optimizer: Rmsprop

Final Results

Model	Min V. Loss Epoch	Min. Val. Loss	Val. Acuracy	Training Loss	Training Accuracy
Simple CNN	12	0.2827	88%	0.1567	94%
VGG16 simple	21	7.4143	54%	7.9669	51%
Inception v3	28	0.0033	100%	0.0327	99.57%
Resnet 50	26	0.0279	99.00%	0.0232	99.86%
Inception Resnet V2	19	1.0903e-07	100%	0.0050	99.86%

Retraining Complete Neural Networks
800 Unique Images: 700 Training + 100 Test; 400 Smiling; 400 Not Smiling
No Augmentation

1. Simple CNN training all layers

```
Epoch 1/30
70/70 [==============================] - 13s 183ms/step - loss: 0.7518 - acc: 0.5000 - val_loss: 0.6965 - val_acc: 0.5000
Epoch 2/30
70/70 [==============================] - 11s 163ms/step - loss: 0.7023 - acc: 0.5271 - val_loss: 0.6918 - val_acc: 0.5900
Epoch 3/30
70/70 [==============================] - 12s 168ms/step - loss: 0.6865 - acc: 0.5900 - val_loss: 0.6638 - val_acc: 0.6500
Epoch 4/30
70/70 [==============================] - 11s 161ms/step - loss: 0.6374 - acc: 0.6814 - val_loss: 0.5783 - val_acc: 0.6800
Epoch 5/30
70/70 [==============================] - 11s 163ms/step - loss: 0.5007 - acc: 0.7814 - val_loss: 0.5012 - val_acc: 0.8000
Epoch 6/30
70/70 [==============================] - 11s 157ms/step - loss: 0.3683 - acc: 0.8386 - val_loss: 0.3795 - val_acc: 0.8100
Epoch 7/30
70/70 [==============================] - 11s 163ms/step - loss: 0.2883 - acc: 0.8814 - val_loss: 0.4033 - val_acc: 0.8100
Epoch 8/30
70/70 [==============================] - 11s 164ms/step - loss: 0.2328 - acc: 0.9071 - val_loss: 0.2845 - val_acc: 0.8700
Epoch 9/30
70/70 [==============================] - 12s 169ms/step - loss: 0.1949 - acc: 0.9243 - val_loss: 0.3229 - val_acc: 0.8800
Epoch 10/30
70/70 [==============================] - 12s 178ms/step - loss: 0.1538 - acc: 0.9371 - val_loss: 0.4424 - val_acc: 0.8400
Epoch 11/30
70/70 [==============================] - 11s 164ms/step - loss: 0.1619 - acc: 0.9471 - val_loss: 0.3160 - val_acc: 0.8600
Epoch 12/30
70/70 [==============================] - 12s 166ms/step - loss: 0.1567 - acc: 0.9414 - val_loss: 0.2827 - val_acc: 0.8800
Epoch 13/30
70/70 [==============================] - 12s 166ms/step - loss: 0.1228 - acc: 0.9571 - val_loss: 0.2849 - val_acc: 0.8900
Epoch 14/30
70/70 [==============================] - 11s 158ms/step - loss: 0.1084 - acc: 0.9729 - val_loss: 0.4113 - val_acc: 0.9100
Epoch 15/30
70/70 [==============================] - 11s 163ms/step - loss: 0.0826 - acc: 0.9686 - val_loss: 0.4842 - val_acc: 0.8400
Epoch 16/30
70/70 [==============================] - 12s 168ms/step - loss: 0.0983 - acc: 0.9686 - val_loss: 0.3792 - val_acc: 0.8800
Epoch 17/30
70/70 [==============================] - 11s 163ms/step - loss: 0.0740 - acc: 0.9800 - val_loss: 0.5067 - val_acc: 0.8500
Epoch 18/30
70/70 [==============================] - 12s 167ms/step - loss: 0.0577 - acc: 0.9800 - val_loss: 0.3944 - val_acc: 0.8900
Epoch 19/30
70/70 [==============================] - 11s 164ms/step - loss: 0.0636 - acc: 0.9786 - val_loss: 0.5978 - val_acc: 0.8800
Epoch 20/30
70/70 [==============================] - 11s 164ms/step - loss: 0.0553 - acc: 0.9814 - val_loss: 0.4733 - val_acc: 0.8800
Epoch 21/30
70/70 [==============================] - 12s 173ms/step - loss: 0.0430 - acc: 0.9900 - val_loss: 0.8465 - val_acc: 0.8700
Epoch 22/30
70/70 [==============================] - 11s 164ms/step - loss: 0.0600 - acc: 0.9743 - val_loss: 1.1258 - val_acc: 0.8400
```

2. Simplified VGG16 retraining all layers

```
Epoch 1/30
70/70 [==============================] - 313s 4s/step - loss: 8.0695 - acc: 0.4943 - val_loss: 8.0590 - val_acc: 0.5000
Epoch 2/30
70/70 [==============================] - 300s 4s/step - loss: 8.0130 - acc: 0.5029 - val_loss: 8.0590 - val_acc: 0.5000
Epoch 3/30
70/70 [==============================] - 300s 4s/step - loss: 8.0590 - acc: 0.5000 - val_loss: 8.0590 - val_acc: 0.5000
Epoch 4/30
70/70 [==============================] - 299s 4s/step - loss: 8.0360 - acc: 0.5014 - val_loss: 8.3814 - val_acc: 0.4800
Epoch 5/30
70/70 [==============================] - 300s 4s/step - loss: 7.9669 - acc: 0.5057 - val_loss: 7.8979 - val_acc: 0.5100
Epoch 6/30
70/70 [==============================] - 303s 4s/step - loss: 8.2893 - acc: 0.4857 - val_loss: 8.2202 - val_acc: 0.4900
Epoch 7/30
70/70 [==============================] - 307s 4s/step - loss: 7.9439 - acc: 0.5071 - val_loss: 7.8979 - val_acc: 0.5100
Epoch 8/30
70/70 [==============================] - 300s 4s/step - loss: 7.9900 - acc: 0.5043 - val_loss: 8.3814 - val_acc: 0.4800
Epoch 9/30
70/70 [==============================] - 301s 4s/step - loss: 8.4044 - acc: 0.4786 - val_loss: 7.7367 - val_acc: 0.5200
Epoch 10/30
70/70 [==============================] - 299s 4s/step - loss: 7.7597 - acc: 0.5186 - val_loss: 8.3814 - val_acc: 0.4800
Epoch 11/30
70/70 [==============================] - 303s 4s/step - loss: 8.0127 - acc: 0.5029 - val_loss: 7.4143 - val_acc: 0.5400
Epoch 12/30
70/70 [==============================] - 309s 4s/step - loss: 8.0821 - acc: 0.4986 - val_loss: 8.7038 - val_acc: 0.4600
Epoch 13/30
70/70 [==============================] - 301s 4s/step - loss: 8.1281 - acc: 0.4957 - val_loss: 7.4143 - val_acc: 0.5400
Epoch 14/30
70/70 [==============================] - 301s 4s/step - loss: 7.9439 - acc: 0.5071 - val_loss: 8.3814 - val_acc: 0.4800
Epoch 15/30
70/70 [==============================] - 301s 4s/step - loss: 8.1742 - acc: 0.4929 - val_loss: 7.8979 - val_acc: 0.5100
Epoch 16/30
70/70 [==============================] - 301s 4s/step - loss: 8.1051 - acc: 0.4971 - val_loss: 8.3814 - val_acc: 0.4800
Epoch 17/30
70/70 [==============================] - 300s 4s/step - loss: 7.9439 - acc: 0.5071 - val_loss: 8.0590 - val_acc: 0.5000
Epoch 18/30
70/70 [==============================] - 300s 4s/step - loss: 8.0130 - acc: 0.5029 - val_loss: 8.0590 - val_acc: 0.5000
Epoch 19/30
70/70 [==============================] - 300s 4s/step - loss: 7.9900 - acc: 0.5043 - val_loss: 8.2202 - val_acc: 0.4900
Epoch 20/30
70/70 [==============================] - 301s 4s/step - loss: 8.3354 - acc: 0.4829 - val_loss: 8.0590 - val_acc: 0.5000
Epoch 21/30
70/70 [==============================] - 300s 4s/step - loss: 7.9669 - acc: 0.5057 - val_loss: 7.4143 - val_acc: 0.5400
Epoch 22/30
70/70 [==============================] - 301s 4s/step - loss: 8.3584 - acc: 0.4814 - val_loss: 8.7038 - val_acc: 0.4600
Epoch 23/30
70/70 [==============================] - 299s 4s/step - loss: 7.9439 - acc: 0.5071 - val_loss: 8.2202 - val_acc: 0.4900
Epoch 24/30
70/70 [==============================] - 304s 4s/step - loss: 7.7827 - acc: 0.5171 - val_loss: 7.5755 - val_acc: 0.5300
Epoch 25/30
70/70 [==============================] - 300s 4s/step - loss: 7.9900 - acc: 0.5043 - val_loss: 8.0590 - val_acc: 0.5000
Epoch 26/30
70/70 [==============================] - 301s 4s/step - loss: 8.1051 - acc: 0.4971 - val_loss: 8.0590 - val_acc: 0.5000
Epoch 27/30
70/70 [==============================] - 301s 4s/step - loss: 7.9900 - acc: 0.5043 - val_loss: 8.0590 - val_acc: 0.5000
Epoch 28/30
70/70 [==============================] - 299s 4s/step - loss: 8.0590 - acc: 0.5000 - val_loss: 8.0590 - val_acc: 0.5000
Epoch 29/30
70/70 [==============================] - 300s 4s/step - loss: 8.0821 - acc: 0.4986 - val_loss: 8.3814 - val_acc: 0.4800
Epoch 30/30
70/70 [==============================] - 300s 4s/step - loss: 8.2663 - acc: 0.4871 - val_loss: 7.7367 - val_acc: 0.5200
```

3. Inception v3 retraining

```
Epoch 1/30
70/70 [==============================] - 132s 2s/step - loss: 0.7573 - acc: 0.7543 - val_loss: 3.5385 - val_acc: 0.6200
Epoch 2/30
70/70 [==============================] - 109s 2s/step - loss: 1.0026 - acc: 0.8757 - val_loss: 6.9035 - val_acc: 0.4900
Epoch 3/30
70/70 [==============================] - 110s 2s/step - loss: 0.4120 - acc: 0.9400 - val_loss: 4.1850 - val_acc: 0.6900
Epoch 4/30
70/70 [==============================] - 108s 2s/step - loss: 0.4072 - acc: 0.9243 - val_loss: 8.6089 - val_acc: 0.4600
Epoch 5/30
70/70 [==============================] - 109s 2s/step - loss: 0.3183 - acc: 0.9271 - val_loss: 3.9895 - val_acc: 0.7500
Epoch 6/30
70/70 [==============================] - 109s 2s/step - loss: 0.6813 - acc: 0.9271 - val_loss: 7.0171 - val_acc: 0.5300
Epoch 7/30
70/70 [==============================] - 110s 2s/step - loss: 0.7812 - acc: 0.9371 - val_loss: 2.0613 - val_acc: 0.8500
Epoch 8/30
70/70 [==============================] - 109s 2s/step - loss: 0.6415 - acc: 0.9400 - val_loss: 4.4360 - val_acc: 0.6500
Epoch 9/30
70/70 [==============================] - 108s 2s/step - loss: 0.4369 - acc: 0.9514 - val_loss: 7.2388 - val_acc: 0.5100
Epoch 10/30
70/70 [==============================] - 110s 2s/step - loss: 0.3765 - acc: 0.9586 - val_loss: 8.3838 - val_acc: 0.4800
Epoch 11/30
70/70 [==============================] - 109s 2s/step - loss: 0.0448 - acc: 0.9900 - val_loss: 4.4745 - val_acc: 0.6900
Epoch 12/30
70/70 [==============================] - 110s 2s/step - loss: 0.0841 - acc: 0.9829 - val_loss: 0.4788 - val_acc: 0.9600
Epoch 13/30
70/70 [==============================] - 110s 2s/step - loss: 0.2014 - acc: 0.9729 - val_loss: 0.3411 - val_acc: 0.9300
Epoch 14/30
70/70 [==============================] - 111s 2s/step - loss: 0.1133 - acc: 0.9814 - val_loss: 0.3936 - val_acc: 0.9400
Epoch 15/30
70/70 [==============================] - 109s 2s/step - loss: 0.0156 - acc: 0.9943 - val_loss: 1.4116 - val_acc: 0.8600
Epoch 16/30
70/70 [==============================] - 110s 2s/step - loss: 0.0846 - acc: 0.9871 - val_loss: 0.3284 - val_acc: 0.9800
Epoch 17/30
70/70 [==============================] - 110s 2s/step - loss: 0.0463 - acc: 0.9929 - val_loss: 0.0127 - val_acc: 0.9900
Epoch 18/30
70/70 [==============================] - 114s 2s/step - loss: 0.3278 - acc: 0.9743 - val_loss: 0.8219 - val_acc: 0.9300
Epoch 19/30
70/70 [==============================] - 109s 2s/step - loss: 0.0540 - acc: 0.9900 - val_loss: 4.8548 - val_acc: 0.7000
Epoch 20/30
70/70 [==============================] - 110s 2s/step - loss: 0.0935 - acc: 0.9900 - val_loss: 1.9357 - val_acc: 0.8800
Epoch 21/30
70/70 [==============================] - 109s 2s/step - loss: 0.1986 - acc: 0.9829 - val_loss: 0.2426 - val_acc: 0.9300
Epoch 22/30
70/70 [==============================] - 110s 2s/step - loss: 0.0199 - acc: 0.9957 - val_loss: 0.9212 - val_acc: 0.9200
Epoch 23/30
70/70 [==============================] - 111s 2s/step - loss: 0.0148 - acc: 0.9957 - val_loss: 0.3112 - val_acc: 0.9500
Epoch 24/30
70/70 [==============================] - 110s 2s/step - loss: 0.0384 - acc: 0.9957 - val_loss: 0.1871 - val_acc: 0.9800
Epoch 25/30
70/70 [==============================] - 110s 2s/step - loss: 1.0420e-04 - acc: 1.0000 - val_loss: 0.0210 - val_acc: 0.9800
Epoch 26/30
70/70 [==============================] - 110s 2s/step - loss: 3.8717e-06 - acc: 1.0000 - val_loss: 0.0092 - val_acc: 0.9900
Epoch 27/30
70/70 [==============================] - 111s 2s/step - loss: 0.0226 - acc: 0.9957 - val_loss: 0.1763 - val_acc: 0.9700
Epoch 28/30
70/70 [==============================] - 112s 2s/step - loss: 0.0327 - acc: 0.9957 - val_loss: 0.0033 - val_acc: 1.0000
Epoch 29/30
70/70 [==============================] - 124s 2s/step - loss: 0.0230 - acc: 0.9986 - val_loss: 1.8602e-06 - val_acc: 1.0000
Epoch 30/30
70/70 [==============================] - 113s 2s/step - loss: 0.0521 - acc: 0.9929 - val_loss: 0.1907 - val_acc: 0.9800
```

4. Resnet50 All Layers retraining

```
Epoch 1/30
70/70 [==============================] - 217s 3s/step - loss: 8.0259 - acc: 0.4957 - val_loss: 9.3485 - val_acc: 0.4200
Epoch 2/30
70/70 [==============================] - 199s 3s/step - loss: 5.4730 - acc: 0.5157 - val_loss: 7.7367 - val_acc: 0.5200
Epoch 3/30
70/70 [==============================] - 200s 3s/step - loss: 2.0635 - acc: 0.6200 - val_loss: 8.0590 - val_acc: 0.5000
Epoch 4/30
70/70 [==============================] - 200s 3s/step - loss: 1.3142 - acc: 0.7386 - val_loss: 6.2821 - val_acc: 0.5400
Epoch 5/30
70/70 [==============================] - 201s 3s/step - loss: 2.1090 - acc: 0.5471 - val_loss: 9.1873 - val_acc: 0.4300
Epoch 6/30
70/70 [==============================] - 201s 3s/step - loss: 1.5781 - acc: 0.7414 - val_loss: 8.3691 - val_acc: 0.4800
Epoch 7/30
70/70 [==============================] - 199s 3s/step - loss: 1.8072 - acc: 0.6371 - val_loss: 6.6150 - val_acc: 0.5200
Epoch 8/30
70/70 [==============================] - 200s 3s/step - loss: 1.4240 - acc: 0.7614 - val_loss: 7.8979 - val_acc: 0.5100
Epoch 9/30
70/70 [==============================] - 199s 3s/step - loss: 1.1109 - acc: 0.8629 - val_loss: 7.9141 - val_acc: 0.5000
Epoch 10/30
70/70 [==============================] - 200s 3s/step - loss: 1.6722 - acc: 0.8314 - val_loss: 2.3111 - val_acc: 0.7600
Epoch 11/30
70/70 [==============================] - 204s 3s/step - loss: 0.6387 - acc: 0.9029 - val_loss: 5.4712 - val_acc: 0.6400
Epoch 12/30
70/70 [==============================] - 204s 3s/step - loss: 0.8309 - acc: 0.8843 - val_loss: 3.6037 - val_acc: 0.7700
Epoch 13/30
70/70 [==============================] - 200s 3s/step - loss: 0.2052 - acc: 0.9471 - val_loss: 0.2932 - val_acc: 0.9000
Epoch 14/30
70/70 [==============================] - 200s 3s/step - loss: 0.1090 - acc: 0.9714 - val_loss: 1.5196 - val_acc: 0.8200
Epoch 15/30
70/70 [==============================] - 200s 3s/step - loss: 0.2290 - acc: 0.9486 - val_loss: 1.0831 - val_acc: 0.9100
Epoch 16/30
70/70 [==============================] - 200s 3s/step - loss: 0.0561 - acc: 0.9886 - val_loss: 0.4240 - val_acc: 0.8400
Epoch 17/30
70/70 [==============================] - 200s 3s/step - loss: 0.3094 - acc: 0.9500 - val_loss: 1.5709 - val_acc: 0.8700
Epoch 18/30
70/70 [==============================] - 200s 3s/step - loss: 0.3672 - acc: 0.9371 - val_loss: 6.8153 - val_acc: 0.5600
Epoch 19/30
70/70 [==============================] - 200s 3s/step - loss: 0.2319 - acc: 0.9700 - val_loss: 4.5732 - val_acc: 0.7100
Epoch 20/30
70/70 [==============================] - 200s 3s/step - loss: 0.0517 - acc: 0.9900 - val_loss: 0.1371 - val_acc: 0.9500
Epoch 21/30
70/70 [==============================] - 200s 3s/step - loss: 0.1079 - acc: 0.9857 - val_loss: 0.7203 - val_acc: 0.9300
Epoch 22/30
70/70 [==============================] - 200s 3s/step - loss: 0.0595 - acc: 0.9771 - val_loss: 0.4099 - val_acc: 0.9400
Epoch 23/30
70/70 [==============================] - 200s 3s/step - loss: 0.0105 - acc: 0.9943 - val_loss: 0.1927 - val_acc: 0.9300
Epoch 24/30
70/70 [==============================] - 200s 3s/step - loss: 0.0498 - acc: 0.9900 - val_loss: 0.1587 - val_acc: 0.9900
Epoch 25/30
70/70 [==============================] - 200s 3s/step - loss: 0.0287 - acc: 0.9971 - val_loss: 0.3039 - val_acc: 0.9500
Epoch 26/30
70/70 [==============================] - 200s 3s/step - loss: 0.0232 - acc: 0.9986 - val_loss: 0.0279 - val_acc: 0.9900
Epoch 27/30
70/70 [==============================] - 200s 3s/step - loss: 1.1391e-05 - acc: 1.0000 - val_loss: 0.0766 - val_acc: 0.9800
Epoch 28/30
70/70 [==============================] - 200s 3s/step - loss: 0.0153 - acc: 0.9986 - val_loss: 1.8155 - val_acc: 0.8300
Epoch 29/30
70/70 [==============================] - 200s 3s/step - loss: 0.0510 - acc: 0.9943 - val_loss: 0.3659 - val_acc: 0.9600
Epoch 30/30
70/70 [==============================] - 212s 3s/step - loss: 0.1817 - acc: 0.9771 - val_loss: 0.2180 - val_acc: 0.9800
```

5. Inception Resnet v2 retraining

```
Epoch 1/30
70/70 [==============================] - 347s 5s/step - loss: 1.4342 - acc: 0.7657 - val_loss: 1.2755 - val_acc: 0.7500
Epoch 2/30
70/70 [==============================] - 251s 4s/step - loss: 1.0308 - acc: 0.8771 - val_loss: 7.9015 - val_acc: 0.5100
Epoch 3/30
70/70 [==============================] - 254s 4s/step - loss: 0.3687 - acc: 0.9443 - val_loss: 0.1705 - val_acc: 0.9900
Epoch 4/30
70/70 [==============================] - 252s 4s/step - loss: 0.1403 - acc: 0.9600 - val_loss: 2.1470 - val_acc: 0.8400
Epoch 5/30
70/70 [==============================] - 248s 4s/step - loss: 0.0345 - acc: 0.9886 - val_loss: 0.5160 - val_acc: 0.9000
Epoch 6/30
70/70 [==============================] - 250s 4s/step - loss: 0.1965 - acc: 0.9700 - val_loss: 0.0024 - val_acc: 1.0000
Epoch 7/30
70/70 [==============================] - 249s 4s/step - loss: 0.0119 - acc: 0.9957 - val_loss: 3.8467e-04 - val_acc: 1.0000
Epoch 8/30
70/70 [==============================] - 249s 4s/step - loss: 0.0773 - acc: 0.9886 - val_loss: 0.0016 - val_acc: 1.0000
Epoch 9/30
70/70 [==============================] - 250s 4s/step - loss: 0.0522 - acc: 0.9857 - val_loss: 0.0011 - val_acc: 1.0000
Epoch 10/30
70/70 [==============================] - 251s 4s/step - loss: 0.0745 - acc: 0.9900 - val_loss: 0.0132 - val_acc: 1.0000
Epoch 11/30
70/70 [==============================] - 256s 4s/step - loss: 0.0126 - acc: 0.9957 - val_loss: 0.2184 - val_acc: 0.9600
Epoch 12/30
70/70 [==============================] - 255s 4s/step - loss: 0.0275 - acc: 0.9971 - val_loss: 0.0151 - val_acc: 0.9800
Epoch 13/30
70/70 [==============================] - 258s 4s/step - loss: 0.0148 - acc: 0.9986 - val_loss: 1.2210e-05 - val_acc: 1.0000
Epoch 14/30
70/70 [==============================] - 267s 4s/step - loss: 2.6128e-06 - acc: 1.0000 - val_loss: 7.3492e-05 - val_acc: 1.0000
Epoch 15/30
70/70 [==============================] - 261s 4s/step - loss: 3.4894e-07 - acc: 1.0000 - val_loss: 1.5802e-06 - val_acc: 1.0000
Epoch 16/30
70/70 [==============================] - 256s 4s/step - loss: 9.7909e-07 - acc: 1.0000 - val_loss: 6.3589e-06 - val_acc: 1.0000
Epoch 17/30
70/70 [==============================] - 256s 4s/step - loss: 0.0021 - acc: 0.9986 - val_loss: 1.7373e-06 - val_acc: 1.0000
Epoch 18/30
70/70 [==============================] - 256s 4s/step - loss: 1.2489e-06 - acc: 1.0000 - val_loss: 4.3199e-06 - val_acc: 1.0000
Epoch 19/30
70/70 [==============================] - 256s 4s/step - loss: 0.0050 - acc: 0.9986 - val_loss: 1.0903e-07 - val_acc: 1.0000
Epoch 20/30
70/70 [==============================] - 258s 4s/step - loss: 0.0039 - acc: 0.9986 - val_loss: 1.1014e-07 - val_acc: 1.0000
Epoch 21/30
70/70 [==============================] - 258s 4s/step - loss: 1.3331e-07 - acc: 1.0000 - val_loss: 2.2085e-07 - val_acc: 1.0000
Epoch 22/30
70/70 [==============================] - 275s 4s/step - loss: 4.2927e-07 - acc: 1.0000 - val_loss: 1.7611e-06 - val_acc: 1.0000
Epoch 23/30
70/70 [==============================] - 261s 4s/step - loss: 0.0082 - acc: 0.9971 - val_loss: 1.6844e-05 - val_acc: 1.0000
Epoch 24/30
70/70 [==============================] - 260s 4s/step - loss: 8.4019e-07 - acc: 1.0000 - val_loss: 1.3032e-04 - val_acc: 1.0000
Epoch 25/30
70/70 [==============================] - 261s 4s/step - loss: 1.7105e-07 - acc: 1.0000 - val_loss: 3.8831e-04 - val_acc: 1.0000
Epoch 26/30
70/70 [==============================] - 265s 4s/step - loss: 0.0414 - acc: 0.9943 - val_loss: 3.2340e-04 - val_acc: 1.0000
Epoch 27/30
70/70 [==============================] - 266s 4s/step - loss: 9.1902e-05 - acc: 1.0000 - val_loss: 2.7950e-06 - val_acc: 1.0000
Epoch 28/30
70/70 [==============================] - 271s 4s/step - loss: 1.1482e-07 - acc: 1.0000 - val_loss: 3.9881e-05 - val_acc: 1.0000
Epoch 29/30
70/70 [==============================] - 274s 4s/step - loss: 1.0975e-07 - acc: 1.0000 - val_loss: 3.0852e-05 - val_acc: 1.0000
```
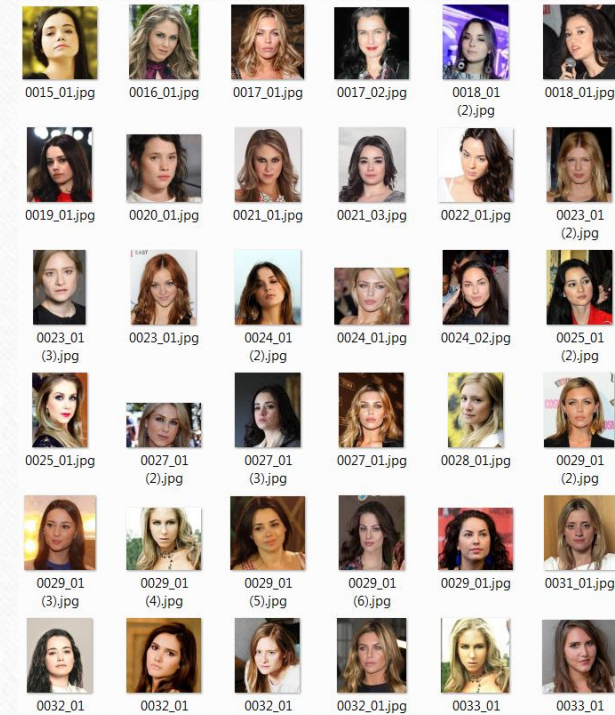
Comparison of Categories: Smiling and Not Smiling

- Smiling (350 Training + 50 Validation)

Not Smiling (350 Training + 50 Validation)