كلية الحاسبات والذكاء الإصطناعي
Faculty of Computers & Artificial Intelligence

Team Number :39

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Paper details: -

A)

Authors name: Sergey Ioffe & Vincent Vanhoucke

Paper name: Inception-v4, Inception-ResNet and the Impact of Residual Connections on Learning

Publisher name: Christian Szegedy Google Inc. 1600 Amphitheatre Pkwy, Mountain View, CA

Year of publication: 23 Feb 2016

B)

The Dataset used: https://www.kaggle.com/datasets/andrewmvd/car-plate-detection

The Implemented algorithms : Inception-v4, Inception-ResNet2

The results

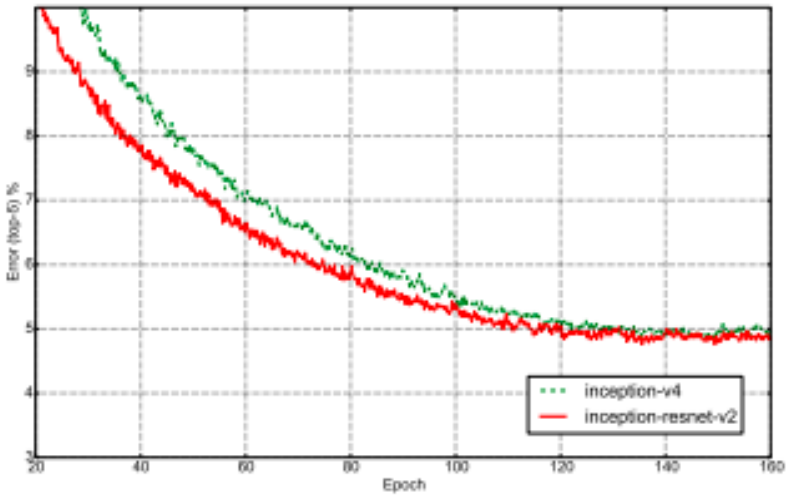


Figure 24. Top-5 error evolution during training of pure Inception-v4 vs a residual Inception of similar computational cost. The evaluation is measured on a single crop on the non-blacklist images of the ILSVRC-2012 validation set. The residual version trained faster and reached slightly better final recall on the validation set.

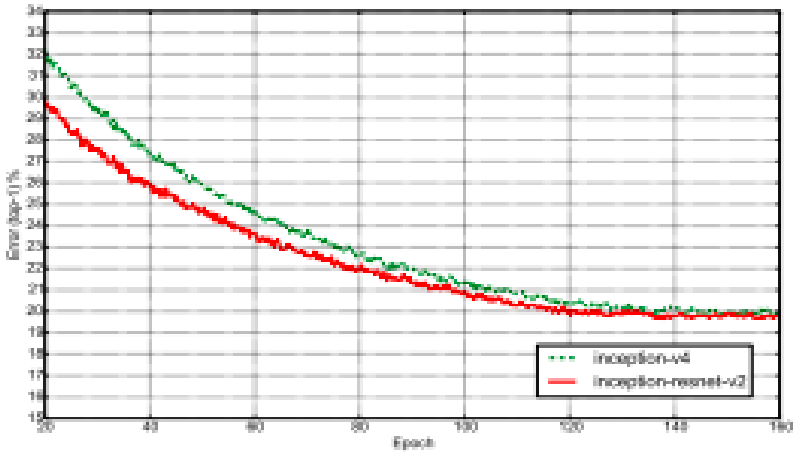


Figure 23. Top-1 error evolution during training of pure Inception-v3 vs a residual Inception of similar computational cost. The evaluation is measured on a single crop on the non-blacklist images of the ILSVRC-2012 validation set. The residual version was training much faster and reached slightly better final accuracy than the traditional Inception-v4.

Project Description Document:

A) General Information on the dataset

Name of the Dataset: Car License Plate Detection

Link of the dataset:

https://www.kaggle.com/datasets/andrewmvd/car-plate-detection

The Total Number of Samples: 433.

The Dimension of Images: (224,224,3)

B) Implementation details

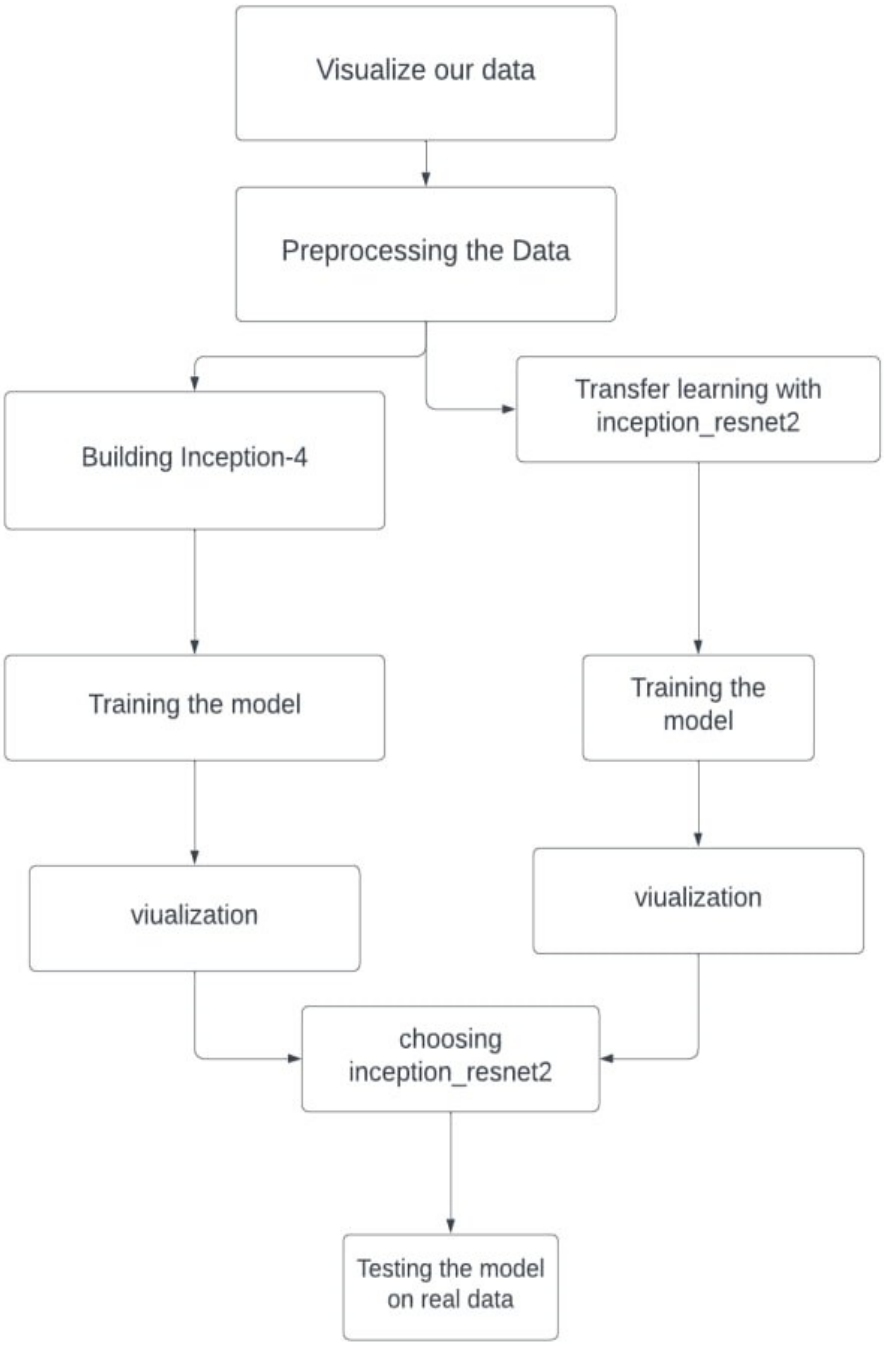
The Ratio used for training: 80%

The Ratio used for testing: 20%

The Number of images in Training: 346

The Number of images in Testing: 87

Block Diagram: -



The Hyperparameters used in Our Model: (Batch_Size, epochs, Learning_rate)

C) Results Details:

The Inception-v4 Optimizer (val_loss: 0.1454)

```
35/35 [==============================] - 8s 238ms/step - loss: 0.1179 - val_loss: 0.1448
Epoch 27/50
35/35 [==============================] - 8s 236ms/step - loss: 0.1172 - val_loss: 0.1452
Epoch 28/50
35/35 [==============================] - 8s 237ms/step - loss: 0.1173 - val_loss: 0.1458
Epoch 29/50
35/35 [==============================] - 8s 236ms/step - loss: 0.1163 - val_loss: 0.1452
Epoch 30/50
35/35 [==============================] - 8s 238ms/step - loss: 0.1172 - val_loss: 0.1452
Epoch 31/50
35/35 [==============================] - 8s 237ms/step - loss: 0.1174 - val_loss: 0.1464
Epoch 32/50
35/35 [==============================] - 8s 238ms/step - loss: 0.1173 - val_loss: 0.1478
Epoch 33/50
35/35 [==============================] - 8s 236ms/step - loss: 0.1159 - val_loss: 0.1471
Epoch 34/50
35/35 [==============================] - 8s 235ms/step - loss: 0.1174 - val_loss: 0.1458
Epoch 35/50
35/35 [==============================] - 8s 237ms/step - loss: 0.1170 - val_loss: 0.1461
Epoch 36/50
35/35 [==============================] - 8s 236ms/step - loss: 0.1168 - val_loss: 0.1467
Epoch 37/50
35/35 [==============================] - 8s 235ms/step - loss: 0.1158 - val_loss: 0.1458
Epoch 38/50
35/35 [==============================] - 8s 237ms/step - loss: 0.1160 - val_loss: 0.1461
Epoch 39/50
35/35 [==============================] - 8s 238ms/step - loss: 0.1155 - val_loss: 0.1462
Epoch 40/50
35/35 [==============================] - 8s 239ms/step - loss: 0.1158 - val_loss: 0.1461
Epoch 41/50
35/35 [==============================] - 8s 237ms/step - loss: 0.1155 - val_loss: 0.1476
Epoch 42/50
35/35 [==============================] - 8s 235ms/step - loss: 0.1150 - val_loss: 0.1465
Epoch 43/50
35/35 [==============================] - 8s 236ms/step - loss: 0.1161 - val_loss: 0.1454
Epoch 44/50
35/35 [==============================] - 8s 239ms/step - loss: 0.1151 - val_loss: 0.1453
Epoch 45/50
35/35 [==============================] - 8s 236ms/step - loss: 0.1150 - val_loss: 0.1465
Epoch 46/50
35/35 [==============================] - 8s 236ms/step - loss: 0.1146 - val_loss: 0.1455
Epoch 47/50
35/35 [==============================] - 8s 238ms/step - loss: 0.1151 - val_loss: 0.1460
Epoch 48/50
35/35 [==============================] - 8s 237ms/step - loss: 0.1153 - val_loss: 0.1470
Epoch 49/50
35/35 [==============================] - 8s 237ms/step - loss: 0.1147 - val_loss: 0.1463
Epoch 50/50
35/35 [==============================] - 8s 236ms/step - loss: 0.1145 - val_loss: 0.1454
```

The SGD Optimizer (val_loss: 0.0477)

```
Epoch 28/50
35/35 [==============================] - 6s 179ms/step - loss: 0.0343 - val_loss: 0.0527
Epoch 29/50
35/35 [==============================] - 6s 171ms/step - loss: 0.0351 - val_loss: 0.0505
Epoch 30/50
35/35 [==============================] - 6s 172ms/step - loss: 0.0365 - val_loss: 0.0505
Epoch 31/50
35/35 [==============================] - 6s 170ms/step - loss: 0.0345 - val_loss: 0.0496
Epoch 32/50
35/35 [==============================] - 6s 167ms/step - loss: 0.0364 - val_loss: 0.0514
Epoch 33/50
35/35 [==============================] - 6s 178ms/step - loss: 0.0356 - val_loss: 0.0510
Epoch 34/50
35/35 [==============================] - 6s 166ms/step - loss: 0.0342 - val_loss: 0.0506
Epoch 35/50
35/35 [==============================] - 6s 169ms/step - loss: 0.0350 - val_loss: 0.0508
Epoch 36/50
35/35 [==============================] - 6s 167ms/step - loss: 0.0340 - val_loss: 0.0489
Epoch 37/50
35/35 [==============================] - 6s 169ms/step - loss: 0.0341 - val_loss: 0.0508
Epoch 38/50
35/35 [==============================] - 6s 167ms/step - loss: 0.0337 - val_loss: 0.0501
Epoch 39/50
35/35 [==============================] - 6s 177ms/step - loss: 0.0341 - val_loss: 0.0503
Epoch 40/50
35/35 [==============================] - 6s 166ms/step - loss: 0.0337 - val_loss: 0.0505
Epoch 41/50
35/35 [==============================] - 6s 173ms/step - loss: 0.0340 - val_loss: 0.0503
Epoch 42/50
35/35 [==============================] - 6s 171ms/step - loss: 0.0351 - val_loss: 0.0479
Epoch 43/50
35/35 [==============================] - 6s 168ms/step - loss: 0.0337 - val_loss: 0.0474
Epoch 44/50
35/35 [==============================] - 6s 175ms/step - loss: 0.0335 - val_loss: 0.0469
Epoch 45/50
35/35 [==============================] - 6s 167ms/step - loss: 0.0333 - val_loss: 0.0474
Epoch 46/50
35/35 [==============================] - 6s 169ms/step - loss: 0.0321 - val_loss: 0.0475
Epoch 47/50
35/35 [==============================] - 6s 167ms/step - loss: 0.0311 - val_loss: 0.0497
Epoch 48/50
35/35 [==============================] - 6s 173ms/step - loss: 0.0318 - val_loss: 0.0497
Epoch 49/50
35/35 [==============================] - 6s 173ms/step - loss: 0.0312 - val_loss: 0.0475
Epoch 50/50
35/35 [==============================] - 6s 173ms/step - loss: 0.0325 - val_loss: 0.0477
```

The Adam Optimizer(Rmsprop, momentum)(val_loss: 0.0162)

```
35/35 [==============================] - 6s 174ms/step - loss: 0.0017 - val_loss: 0.0152
Epoch 29/50
35/35 [==============================] - 6s 179ms/step - loss: 0.0016 - val_loss: 0.0182
Epoch 30/50
35/35 [==============================] - 6s 185ms/step - loss: 0.0016 - val_loss: 0.0193
Epoch 31/50
35/35 [==============================] - 6s 178ms/step - loss: 0.0015 - val_loss: 0.0180
Epoch 32/50
35/35 [==============================] - 6s 179ms/step - loss: 0.0014 - val_loss: 0.0176
Epoch 33/50
35/35 [==============================] - 6s 173ms/step - loss: 0.0015 - val_loss: 0.0177
Epoch 34/50
35/35 [==============================] - 6s 174ms/step - loss: 0.0015 - val_loss: 0.0190
Epoch 35/50
35/35 [==============================] - 6s 177ms/step - loss: 0.0014 - val_loss: 0.0173
Epoch 36/50
35/35 [==============================] - 6s 179ms/step - loss: 0.0014 - val_loss: 0.0148
Epoch 37/50
35/35 [==============================] - 6s 173ms/step - loss: 0.0013 - val_loss: 0.0157
Epoch 38/50
35/35 [==============================] - 6s 173ms/step - loss: 0.0014 - val_loss: 0.0142
Epoch 39/50
35/35 [==============================] - 6s 174ms/step - loss: 0.0014 - val_loss: 0.0139
Epoch 40/50
35/35 [==============================] - 6s 185ms/step - loss: 0.0015 - val_loss: 0.0129
Epoch 41/50
35/35 [==============================] - 6s 175ms/step - loss: 0.0013 - val_loss: 0.0125
Epoch 42/50
35/35 [==============================] - 6s 178ms/step - loss: 0.0013 - val_loss: 0.0150
Epoch 43/50
35/35 [==============================] - 6s 179ms/step - loss: 0.0013 - val_loss: 0.0131
Epoch 44/50
35/35 [==============================] - 6s 172ms/step - loss: 0.0013 - val_loss: 0.0149
Epoch 45/50
35/35 [==============================] - 6s 183ms/step - loss: 0.0014 - val_loss: 0.0128
Epoch 46/50
35/35 [==============================] - 6s 180ms/step - loss: 0.0013 - val_loss: 0.0135
Epoch 47/50
35/35 [==============================] - 6s 178ms/step - loss: 0.0013 - val_loss: 0.0158
Epoch 48/50
35/35 [==============================] - 6s 176ms/step - loss: 0.0013 - val_loss: 0.0142
Epoch 49/50
35/35 [==============================] - 6s 173ms/step - loss: 0.0013 - val_loss: 0.0141
Epoch 50/50
35/35 [==============================] - 6s 186ms/step - loss: 0.0013 - val_loss: 0.0162
```

GitHub Link: https://github.com/mohamedshata2002/object_detection_cars