Topics in Deep learning Hands-On Unit 4

Name – B Pravena Section – B

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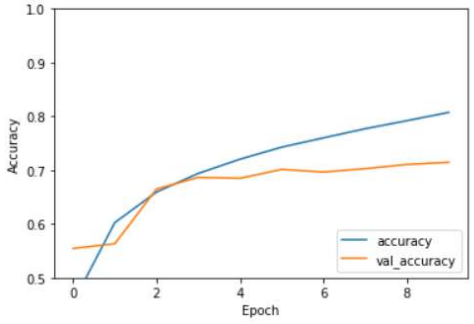
Google collab link -:

https://colab.research.google.com/drive/1T9cTuP6sFVbHFD_kKkw_jb08AYvb0ehT?usp=sharing

Outputs -:

```
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 conv2d_3 (Conv2D)           (None, 30, 30, 32)        896

 max_pooling2d_2 (MaxPooling  (None, 15, 15, 32)       0
 2D)

 conv2d_4 (Conv2D)           (None, 13, 13, 64)        18496

 max_pooling2d_3 (MaxPooling  (None, 6, 6, 64)         0
 2D)

 conv2d_5 (Conv2D)           (None, 4, 4, 64)          36928

=================================================================
Total params: 56,320
Trainable params: 56,320
Non-trainable params: 0
_________________________________________________________________
Epoch 1/10
1563/1563 [==============================] - 78s 49ms/step - loss: 1.5059 - accuracy: 0.4537 - val_loss: 1.2609 - val_accuracy: 0.5545
Epoch 2/10
1563/1563 [==============================] - 76s 48ms/step - loss: 1.1234 - accuracy: 0.6025 - val_loss: 1.2362 - val_accuracy: 0.5632
Epoch 3/10
1563/1563 [==============================] - 74s 47ms/step - loss: 0.9704 - accuracy: 0.6594 - val_loss: 0.9607 - val_accuracy: 0.6650
Epoch 4/10
1563/1563 [==============================] - 75s 48ms/step - loss: 0.8738 - accuracy: 0.6939 - val_loss: 0.8980 - val_accuracy: 0.6866
Epoch 5/10
1563/1563 [==============================] - 75s 48ms/step - loss: 0.7953 - accuracy: 0.7204 - val_loss: 0.9378 - val_accuracy: 0.6849
Epoch 6/10
1563/1563 [==============================] - 75s 48ms/step - loss: 0.7341 - accuracy: 0.7428 - val_loss: 0.8732 - val_accuracy: 0.7015
Epoch 7/10
1563/1563 [==============================] - 76s 49ms/step - loss: 0.6801 - accuracy: 0.7600 - val_loss: 0.8870 - val_accuracy: 0.6965
Epoch 8/10
1563/1563 [==============================] - 77s 49ms/step - loss: 0.6342 - accuracy: 0.7771 - val_loss: 0.8935 - val_accuracy: 0.7028
```

```
Epoch 10/10
1563/1563 [==============================] - 77s 49ms/step - loss: 0.5472 - accuracy: 0.8074 - val_loss: 0.8739 - val_accuracy: 0.7147
313/313 - 4s - loss: 0.8739 - accuracy: 0.7147 - 4s/epoch - 12ms/step
0.7146999835968018
```



```
Model: "vgg16"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
input_1 (InputLayer)         [(None, 224, 224, 3)]     0

block1_conv1 (Conv2D)        (None, 224, 224, 64)      1792

block1_conv2 (Conv2D)        (None, 224, 224, 64)      36928

block1_pool (MaxPooling2D)   (None, 112, 112, 64)      0

block2_conv1 (Conv2D)        (None, 112, 112, 128)     73856

block2_conv2 (Conv2D)        (None, 112, 112, 128)     147584

block2_pool (MaxPooling2D)   (None, 56, 56, 128)       0

block3_conv1 (Conv2D)        (None, 56, 56, 256)       295168

block3_conv2 (Conv2D)        (None, 56, 56, 256)       590080

block3_conv3 (Conv2D)        (None, 56, 56, 256)       590080

block3_pool (MaxPooling2D)   (None, 28, 28, 256)       0

block4_conv1 (Conv2D)        (None, 28, 28, 512)       1180160

block4_conv2 (Conv2D)        (None, 28, 28, 512)       2359808

block4_conv3 (Conv2D)        (None, 28, 28, 512)       2359808

block4_pool (MaxPooling2D)   (None, 14, 14, 512)       0

block5_conv1 (Conv2D)        (None, 14, 14, 512)       2359808

block5_conv2 (Conv2D)        (None, 14, 14, 512)       2359808

block5_conv3 (Conv2D)        (None, 14, 14, 512)       2359808

block5_pool (MaxPooling2D)   (None, 7, 7, 512)         0

flatten (Flatten)            (None, 25088)             0

fc1 (Dense)                  (None, 4096)              102764544

fc2 (Dense)                  (None, 4096)              16781312

predictions (Dense)          (None, 1000)              4097000

=================================================================
Total params: 138,357,544
Trainable params: 138,357,544
Non-trainable params: 0
_________________________________________________________________
Downloading data from https://storage.googleapis.com/tensorflow/keras-applications/vgg16/vgg16_weights_tf_dim_ordering_tf_kernels_notop.h5
58892288/58889256 [==============================] - 1s 0us/step
```

```
g_model = define_generator(latent_dim)

  # create the gan
gan_model = define_gan(g_model, d_model)

  # load image data
dataset = load_real_samples()

  # train model
train(g_model, d_model, gan_model, dataset, latent_dim)
```

```
Downloading data from https://storage.googleapis.com/tensorflow/tf-keras-datasets/mnist.npz
/usr/local/lib/python3.7/dist-packages/keras/optimizer_v2/adam.py:105: UserWarning: The `lr` argument is deprecated, use `learning_rate` instead.
  super(Adam, self).__init__(name, **kwargs)
11493376/11490434 [==============================] - 0s 0us/step
11501568/11490434 [==============================] - 0s 0us/step
>1, 234/234, d=0.716, g=0.688
>2, 234/234, d=0.705, g=0.707
>3, 234/234, d=0.694, g=0.735
>4, 234/234, d=0.688, g=0.754
>5, 234/234, d=0.678, g=0.777
>6, 234/234, d=0.664, g=0.801
>7, 234/234, d=0.661, g=0.824
>8, 234/234, d=0.651, g=0.844
>9, 234/234, d=0.642, g=0.853
>10, 234/234, d=0.645, g=0.863
>11, 234/234, d=0.639, g=0.861
```

```
[7]
Epoch 29/50
235/235 [==============================] - 3s 12ms/step - loss: 0.0931 - val_loss: 0.0918
Epoch 30/50
235/235 [==============================] - 3s 13ms/step - loss: 0.0930 - val_loss: 0.0919
Epoch 31/50
235/235 [==============================] - 3s 12ms/step - loss: 0.0930 - val_loss: 0.0918
Epoch 32/50
235/235 [==============================] - 3s 12ms/step - loss: 0.0930 - val_loss: 0.0917
Epoch 33/50
235/235 [==============================] - 3s 13ms/step - loss: 0.0930 - val_loss: 0.0918
Epoch 34/50
235/235 [==============================] - 3s 12ms/step - loss: 0.0929 - val_loss: 0.0917
Epoch 35/50
235/235 [==============================] - 3s 13ms/step - loss: 0.0929 - val_loss: 0.0918
Epoch 36/50
235/235 [==============================] - 3s 13ms/step - loss: 0.0929 - val_loss: 0.0917
Epoch 37/50
235/235 [==============================] - 3s 13ms/step - loss: 0.0929 - val_loss: 0.0918
Epoch 38/50
235/235 [==============================] - 3s 12ms/step - loss: 0.0928 - val_loss: 0.0917
Epoch 39/50
235/235 [==============================] - 3s 12ms/step - loss: 0.0928 - val_loss: 0.0916
Epoch 40/50
235/235 [==============================] - 3s 12ms/step - loss: 0.0928 - val_loss: 0.0916
Epoch 41/50
235/235 [==============================] - 3s 12ms/step - loss: 0.0928 - val_loss: 0.0916
Epoch 42/50
235/235 [==============================] - 3s 12ms/step - loss: 0.0928 - val_loss: 0.0917
Epoch 43/50
235/235 [==============================] - 3s 13ms/step - loss: 0.0928 - val_loss: 0.0916
Epoch 44/50
235/235 [==============================] - 3s 13ms/step - loss: 0.0927 - val_loss: 0.0917
Epoch 45/50
235/235 [==============================] - 3s 13ms/step - loss: 0.0927 - val_loss: 0.0915
Epoch 46/50
235/235 [==============================] - 3s 13ms/step - loss: 0.0927 - val_loss: 0.0916
Epoch 47/50
235/235 [==============================] - 3s 13ms/step - loss: 0.0927 - val_loss: 0.0916
Epoch 48/50
235/235 [==============================] - 3s 13ms/step - loss: 0.0927 - val_loss: 0.0915
Epoch 49/50
235/235 [==============================] - 3s 12ms/step - loss: 0.0927 - val_loss: 0.0915
Epoch 50/50
235/235 [==============================] - 3s 12ms/step - loss: 0.0927 - val_loss: 0.0916
```