

Convolutional Neural Network

Importing the libraries

```
In [1]: import tensorflow as tf
        from keras.preprocessing.image import ImageDataGenerator
```

Using TensorFlow backend.

```
In [2]: tf.__version__
```

```
Out[2]: '2.2.0-rc2'
```

Part 1 - Data Preprocessing

Generating images for the Training set

```
In [0]: train_datagen = ImageDataGenerator(rescale = 1./255,
                                           shear_range = 0.2,
                                           zoom_range = 0.2,
                                           horizontal_flip = True)
```

Generating images for the Test set

```
In [0]: test_datagen = ImageDataGenerator(rescale = 1./255)
```

Creating the Training set

```
In [5]: training_set = train_datagen.flow_from_directory('dataset/training_set',
                                                         target_size = (64, 64),
                                                         batch_size = 32,
                                                         class_mode = 'binary')
```

Found 334 images belonging to 3 classes.

Creating the Test set

```
In [6]: test_set = test_datagen.flow_from_directory('dataset/test_set',  
                                                    target_size = (64, 64),  
                                                    batch_size = 32,  
                                                    class_mode = 'binary')
```

Found 334 images belonging to 3 classes.

Part 2 - Building the CNN

Initialising the CNN

```
In [0]: cnn = tf.keras.models.Sequential()
```

Step 1 - Convolution

```
In [0]: cnn.add(tf.keras.layers.Conv2D(filters=32, kernel_size=3, padding="same", a
```

Step 2 - Pooling

```
In [0]: cnn.add(tf.keras.layers.MaxPool2D(pool_size=2, strides=2, padding='valid'))
```

Adding a second convolutional layer

```
In [0]: cnn.add(tf.keras.layers.Conv2D(filters=32, kernel_size=3, padding="same", a  
cnn.add(tf.keras.layers.MaxPool2D(pool_size=2, strides=2, padding='valid'))
```

Step 3 - Flattening

```
In [0]: cnn.add(tf.keras.layers.Flatten())
```

Step 4 - Full Connection

```
In [0]: cnn.add(tf.keras.layers.Dense(units=128, activation='relu'))
```

Step 5 - Output Layer

```
In [0]: cnn.add(tf.keras.layers.Dense(units=1, activation='sigmoid'))
```

Part 3 - Training the CNN

Compiling the CNN

```
In [0]: cnn.compile(optimizer = 'adam', loss = 'binary_crossentropy', metrics = ['a
```

Training the CNN on the Training set and evaluating it on the Test set

```
In [15]: cnn.fit_generator(training_set,
                           steps_per_epoch = 334,
                           epochs = 25,
                           validation_data = test_set,
                           validation_steps = 334)
```

WARNING:tensorflow:From <ipython-input-15-a0db581e8660>:5: Model.fit_generator (from tensorflow.python.keras.engine.training) is deprecated and will be removed in a future version.

Instructions for updating:

Please use Model.fit, which supports generators.

Epoch 1/25

334/334 [=====] - 116s 346ms/step - loss: -37484704.0000 - accuracy: 0.4987 - val_loss: -218133216.0000 - val_accuracy: 0.4999

Epoch 2/25

334/334 [=====] - 115s 343ms/step - loss: -1530877952.0000 - accuracy: 0.5002 - val_loss: -4208331776.0000 - val_accuracy: 0.5004

Epoch 3/25

334/334 [=====] - 114s 342ms/step - loss: -10730311680.0000 - accuracy: 0.4992 - val_loss: -21080999936.0000 - val_accuracy: 0.5000

Epoch 4/25

334/334 [=====] - 114s 343ms/step - loss: -38008516608.0000 - accuracy: 0.4999 - val_loss: -62359158784.0000 - val_accuracy: 0.4993

Epoch 5/25

334/334 [=====] - 114s 342ms/step - loss: -95429894144.0000 - accuracy: 0.5003 - val_loss: -141409304576.0000 - val_accuracy: 0.5004

Epoch 6/25

334/334 [=====] - 114s 342ms/step - loss: -195819356160.0000 - accuracy: 0.5002 - val_loss: -270405451776.0000 - val_accuracy: 0.5005

Epoch 7/25

334/334 [=====] - 114s 343ms/step - loss: -350490820608.0000 - accuracy: 0.4992 - val_loss: -460973342720.0000 - val_accuracy: 0.4995

Epoch 8/25

334/334 [=====] - 115s 343ms/step - loss: -567733321728.0000 - accuracy: 0.5008 - val_loss: -721733025792.0000 - val_accuracy: 0.5005

Epoch 9/25

334/334 [=====] - 119s 357ms/step - loss: -871657046016.0000 - accuracy: 0.4992 - val_loss: -1073665343488.0000 - val_accuracy: 0.4997

Epoch 10/25

334/334 [=====] - 115s 344ms/step - loss: -1252980817920.0000 - accuracy: 0.5005 - val_loss: -1517686751232.0000 - val_accuracy: 0.5002

Epoch 11/25

334/334 [=====] - 115s 345ms/step - loss: -1743530622976.0000 - accuracy: 0.5000 - val_loss: -2079168659456.0000 - val_accuracy: 0.4998

Epoch 12/25

```
334/334 [=====] - 115s 345ms/step - loss: -23418
85968384.0000 - accuracy: 0.5000 - val_loss: -2746375471104.0000 - val_ac
curacy: 0.5003
Epoch 13/25
334/334 [=====] - 115s 344ms/step - loss: -30436
18455552.0000 - accuracy: 0.5000 - val_loss: -3542708387840.0000 - val_ac
curacy: 0.4995
Epoch 14/25
334/334 [=====] - 115s 343ms/step - loss: -38827
42448128.0000 - accuracy: 0.5001 - val_loss: -4493544521728.0000 - val_ac
curacy: 0.4996
Epoch 15/25
334/334 [=====] - 121s 361ms/step - loss: -49043
50908416.0000 - accuracy: 0.4998 - val_loss: -5572023812096.0000 - val_ac
curacy: 0.4997
Epoch 16/25
334/334 [=====] - 115s 344ms/step - loss: -60282
49268224.0000 - accuracy: 0.4999 - val_loss: -6827078057984.0000 - val_ac
curacy: 0.5000
Epoch 17/25
334/334 [=====] - 115s 345ms/step - loss: -73483
82859264.0000 - accuracy: 0.5007 - val_loss: -8296905310208.0000 - val_ac
curacy: 0.4998
Epoch 18/25
334/334 [=====] - 115s 345ms/step - loss: -88309
23571200.0000 - accuracy: 0.4989 - val_loss: -9900669272064.0000 - val_ac
curacy: 0.5004
Epoch 19/25
334/334 [=====] - 115s 345ms/step - loss: -10479
195914240.0000 - accuracy: 0.5007 - val_loss: -11772465512448.0000 - val_
accuracy: 0.5003
Epoch 20/25
334/334 [=====] - 116s 346ms/step - loss: -12438
010331136.0000 - accuracy: 0.5002 - val_loss: -13772319096832.0000 - val_
accuracy: 0.4996
Epoch 21/25
334/334 [=====] - 115s 345ms/step - loss: -14471
482310656.0000 - accuracy: 0.4999 - val_loss: -15963112079360.0000 - val_
accuracy: 0.4998
Epoch 22/25
334/334 [=====] - 115s 345ms/step - loss: -16802
979512320.0000 - accuracy: 0.4998 - val_loss: -18570987700224.0000 - val_
accuracy: 0.5004
Epoch 23/25
334/334 [=====] - 115s 345ms/step - loss: -19371
355275264.0000 - accuracy: 0.4995 - val_loss: -21191286849536.0000 - val_
accuracy: 0.4998
Epoch 24/25
334/334 [=====] - 116s 346ms/step - loss: -22239
346950144.0000 - accuracy: 0.5005 - val_loss: -24250689781760.0000 - val_
accuracy: 0.5002
Epoch 25/25
334/334 [=====] - 115s 345ms/step - loss: -25315
573235712.0000 - accuracy: 0.5000 - val_loss: -27645225992192.0000 - val_
accuracy: 0.4999
```

Out[15]: <tensorflow.python.keras.callbacks.History at 0x7fbafb03aeb8>

