

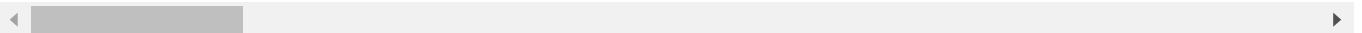
Dataset : http://cb.lk/covid_19

!wget http://cb.lk/covid_19

```
--2022-07-19 07:20:40-- http://cb.lk/covid\_19
Resolving cb.lk (cb.lk)... 172.67.187.81, 104.21.72.203, 2606:4700:3032::ac43:bb51, ...
Connecting to cb.lk (cb.lk)|172.67.187.81|:80... connected.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: https://cb.lk/covid\_19 [following]
--2022-07-19 07:20:40-- https://cb.lk/covid\_19
Connecting to cb.lk (cb.lk)|172.67.187.81|:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: https://www.dropbox.com/s/7rjw6oet4za01op/CovidDataset-20200427T133042Z-001.zip
--2022-07-19 07:20:40-- https://www.dropbox.com/s/7rjw6oet4za01op/CovidDataset-20200427T133042Z-001.zip
Resolving www.dropbox.com (www.dropbox.com)... 162.125.81.18, 2620:100:6030:18::a27d:50:
Connecting to www.dropbox.com (www.dropbox.com)|162.125.81.18|:443... connected.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: /s/raw/7rjw6oet4za01op/CovidDataset-20200427T133042Z-001.zip [following]
--2022-07-19 07:20:41-- https://www.dropbox.com/s/raw/7rjw6oet4za01op/CovidDataset-20200427T133042Z-001.zip
Reusing existing connection to www.dropbox.com:443.
HTTP request sent, awaiting response... 302 Found
Location: https://uc70d2f314c7c1fe1e99d4c52f2b.dl.dropboxusercontent.com/cd/0/inline/BpU8hP1lvPZ4WAtOg1B7RJwNEcX1NSwsC\_Zk8yV2RFTdbhwIq8lOpYGAJ6PXVY5i
--2022-07-19 07:20:42-- https://uc70d2f314c7c1fe1e99d4c52f2b.dl.dropboxusercontent.com/cd/0/inline/BpU8hP1lvPZ4WAtOg1B7RJwNEcX1NSwsC\_Zk8yV2RFTdbhwIq8lOpYGAJ6PXVY5i
Resolving uc70d2f314c7c1fe1e99d4c52f2b.dl.dropboxusercontent.com (uc70d2f314c7c1fe1e99d4c52f2b.dl.dropboxusercontent.com)... 162.125.81.18, 2620:100:6030:18::a27d:50:
Connecting to uc70d2f314c7c1fe1e99d4c52f2b.dl.dropboxusercontent.com (uc70d2f314c7c1fe1e99d4c52f2b.dl.dropboxusercontent.com)... connected.
HTTP request sent, awaiting response... 302 Found
Location: /cd/0/inline2/BpU8hP1lvPZ4WAtOg1B7RJwNEcX1NSwsC_Zk8yV2RFTdbhwIq8lOpYGAJ6PXVY5i [following]
--2022-07-19 07:20:42-- https://uc70d2f314c7c1fe1e99d4c52f2b.dl.dropboxusercontent.com/cd/0/inline2/BpU8hP1lvPZ4WAtOg1B7RJwNEcX1NSwsC\_Zk8yV2RFTdbhwIq8lOpYGAJ6PXVY5i
Reusing existing connection to uc70d2f314c7c1fe1e99d4c52f2b.dl.dropboxusercontent.com:443.
HTTP request sent, awaiting response... 200 OK
Length: 140830621 (134M) [application/zip]
Saving to: 'covid_19'
```

covid_19 100%[=====>] 134.31M 20.6MB/s in 7.4s

2022-07-19 07:20:51 (18.1 MB/s) - 'covid_19' saved [140830621/140830621]



!unzip covid_19

```
inflating: CovidDataset/Val/Normal/NORMAL2-IM-0652-0001.jpeg
inflating: CovidDataset/Train/Normal/IM-0691-0001.jpeg
inflating: CovidDataset/Train/Covid/CD50BA96-6982-4C80-AE7B-5F67ACDBFA56.jpeg
inflating: CovidDataset/Train/Normal/NORMAL2-IM-0976-0001.jpeg
inflating: CovidDataset/Train/Covid/covid-19-pneumonia-20-pa-on-admission.jpg
inflating: CovidDataset/Train/Covid/1-s2.0-S0929664620300449-gr2_lrg-c.jpg
inflating: CovidDataset/Train/Covid/fff49165-b22d-4bb4-b9d1-d5d62c52436c.annot.orig
inflating: CovidDataset/Train/Covid/1.CXRCTThoraximagesofCOVID-19fromSingapore.pdf-(
inflating: CovidDataset/Val/Normal/NORMAL2-IM-0395-0001.jpeg
inflating: CovidDataset/Train/Normal/IM-0182-0001.jpeg
inflating: CovidDataset/Train/Covid/covid-19-pneumonia-evolution-over-a-week-1-day0
inflating: CovidDataset/Val/Normal/NORMAL2-IM-0914-0001.jpeg
inflating: CovidDataset/Train/Covid/covid-19-pneumonia-30-PA.jpg
```

```

inflating: CovidDataset/Train/Covid/nejmc2001573_f1a.jpeg
inflating: CovidDataset/Train/Covid/kjr-21-e25-g001-l-a.jpg
inflating: CovidDataset/Val/Normal/NORMAL2-IM-0873-0001.jpeg
inflating: CovidDataset/Train/Normal/NORMAL2-IM-0501-0001.jpeg
inflating: CovidDataset/Train/Normal/IM-0667-0001.jpeg
inflating: CovidDataset/Train/Normal/IM-0551-0001-0002.jpeg
inflating: CovidDataset/Train/Normal/IM-0176-0001.jpeg
inflating: CovidDataset/Train/Covid/lancet-case2b.jpg
inflating: CovidDataset/Train/Normal/IM-0713-0001.jpeg
inflating: CovidDataset/Train/Covid/all14238-fig-0001-m-c.jpg
inflating: CovidDataset/Val/Covid/covid-19-pneumonia-14-PA.png
inflating: CovidDataset/Val/Normal/NORMAL2-IM-0851-0001-0001.jpeg
inflating: CovidDataset/Train/Normal/NORMAL2-IM-1154-0001-0002.jpeg
inflating: CovidDataset/Train/Normal/IM-0619-0001.jpeg
inflating: CovidDataset/Val/Normal/NORMAL2-IM-0441-0001.jpeg
inflating: CovidDataset/Val/Normal/NORMAL2-IM-0765-0001.jpeg
inflating: CovidDataset/Train/Normal/IM-0172-0001.jpeg
inflating: CovidDataset/Train/Normal/IM-0551-0001-0001.jpeg
inflating: CovidDataset/Train/Covid/gr1_lrg-b.jpg
inflating: CovidDataset/Train/Covid/1-s2.0-S0929664620300449-gr2_lrg-b.jpg
inflating: CovidDataset/Train/Normal/IM-0514-0001.jpeg
inflating: CovidDataset/Train/Covid/covid-19-pneumonia-20.jpg
inflating: CovidDataset/Train/Normal/IM-0544-0001.jpeg
inflating: CovidDataset/Val/Normal/NORMAL2-IM-1022-0001.jpeg
inflating: CovidDataset/Train/Normal/NORMAL2-IM-0935-0001.jpeg
inflating: CovidDataset/Train/Covid/covid-19-pneumonia-22-day1-pa.png
inflating: CovidDataset/Train/Normal/NORMAL2-IM-1288-0001.jpeg
inflating: CovidDataset/Train/Covid/16669_1_1.jpeg
inflating: CovidDataset/Train/Covid/nejmoa2001191_f4.jpeg
inflating: CovidDataset/Val/Normal/NORMAL2-IM-0462-0001.jpeg
inflating: CovidDataset/Val/Normal/NORMAL2-IM-0894-0001.jpeg
inflating: CovidDataset/Train/Covid/nejmc2001573_f1b.jpeg
inflating: CovidDataset/Train/Normal/NORMAL2-IM-1094-0001-0001.jpeg
inflating: CovidDataset/Train/Normal/IM-0543-0001-0002.jpeg
inflating: CovidDataset/Train/Covid/16669_3_1.jpeg
inflating: CovidDataset/Train/Covid/covid-19-pneumonia-58-day-7.jpg
inflating: CovidDataset/Train/Normal/IM-0536-0001.jpeg

inflating: CovidDataset/Train/Normal/NORMAL2-IM-1214-0001.jpeg
inflating: CovidDataset/Train/Covid/AR-2.jpg
inflating: CovidDataset/Train/Covid/9fdd3c3032296fd04d2cad5d9070d4_jumbo.jpeg
inflating: CovidDataset/Train/Covid/1B734A89-A1BF-49A8-A1D3-66FAFA4FAC5D.jpeg
inflating: CovidDataset/Train/Normal/IM-0156-0001.jpeg
inflating: CovidDataset/Train/Normal/NORMAL2-IM-1111-0001.jpeg
inflating: CovidDataset/Train/Covid/FE9F9A5D-2830-46F9-851B-1FF4534959BE.jpeg

```

```
TRAIN_PATH = "CovidDataset/Train"
```

```
VAL_PATH = "CovidDataset/Test"
```

```

import numpy as np
import matplotlib.pyplot as plt
import keras
from keras.layers import *

```

```

from keras.models import *
from keras.preprocessing import image

# CNN Based Model in Keras

model = Sequential()
model.add(Conv2D(32, kernel_size=(3,3), activation='relu', input_shape=(224,224,3)))
model.add(Conv2D(64, (3,3), activation='relu'))
model.add(MaxPooling2D(pool_size=(2,2)))
model.add(Dropout(0.25))

model.add(Conv2D(64, (3,3), activation='relu'))
model.add(MaxPooling2D(pool_size=(2,2)))
model.add(Dropout(0.25))

model.add(Conv2D(128, (3,3), activation='relu'))
model.add(MaxPooling2D(pool_size=(2,2)))
model.add(Dropout(0.25))

model.add(Flatten())
model.add(Dense(64, activation='relu'))
model.add(Dropout(0.5))
model.add(Dense(1, activation='sigmoid'))

model.compile(loss=keras.losses.binary_crossentropy, optimizer='adam', metrics=['accuracy'])

model.summary()

```

Model: "sequential"

Layer (type)	Output Shape	Param #
=====		
conv2d (Conv2D)	(None, 222, 222, 32)	896
conv2d_1 (Conv2D)	(None, 220, 220, 64)	18496
max_pooling2d (MaxPooling2D)	(None, 110, 110, 64)	0
dropout (Dropout)	(None, 110, 110, 64)	0
conv2d_2 (Conv2D)	(None, 108, 108, 64)	36928
max_pooling2d_1 (MaxPooling2D)	(None, 54, 54, 64)	0
dropout_1 (Dropout)	(None, 54, 54, 64)	0
conv2d_3 (Conv2D)	(None, 52, 52, 128)	73856
max_pooling2d_2 (MaxPooling2D)	(None, 26, 26, 128)	0

dropout_2 (Dropout)	(None, 26, 26, 128)	0
flatten (Flatten)	(None, 86528)	0
dense (Dense)	(None, 64)	5537856
dropout_3 (Dropout)	(None, 64)	0
dense_1 (Dense)	(None, 1)	65

```
=====
Total params: 5,668,097
Trainable params: 5,668,097
Non-trainable params: 0
```

```
# Train from scratch
```

```
train_datagen = image.ImageDataGenerator(
    rescale = 1./255,
    shear_range = 0.2,
    zoom_range = 0.2,
    horizontal_flip = True,
)
```

```
test_dataset = image.ImageDataGenerator(rescale=1./255)
```

```
train_generator = train_datagen.flow_from_directory(
    'CovidDataset/Train',
    target_size = (224,224),
    batch_size = 32,
    class_mode = 'binary')
```

```
Found 224 images belonging to 2 classes.
```

```
train_generator.class_indices
```

```
{'Covid': 0, 'Normal': 1}
```

```
validation_generator = test_dataset.flow_from_directory(
    'CovidDataset/Val',
    target_size = (224,224),
    batch_size = 32,
    class_mode = 'binary')
```

```
Found 60 images belonging to 2 classes.
```

```
hist = model.fit_generator(
    train_generator,
    steps_per_epoch=8,
```

```

epochs = 10,
validation_data = validation_generator,
validation_steps=2
)

/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:6: UserWarning: `Model.fit_

Epoch 1/10
7/8 [=====>....] - ETA: 9s - loss: 2.1320 - accuracy: 0.5223 WARNING
8/8 [=====] - 78s 9s/step - loss: 2.1320 - accuracy: 0.5223 - \
<
model.save("model_adv.h5")

model.evaluate_generator(train_generator)

/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: UserWarning: `Model.eval
"""Entry point for launching an IPython kernel.
[0.6930409073829651, 0.5]
<
model.evaluate_generator(validation_generator)

/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: UserWarning: `Model.eval
"""Entry point for launching an IPython kernel.
[0.6924629211425781, 0.5]
<
model = load_model('model_adv.h5')

import os

train_generator.class_indices

{'Covid': 0, 'Normal': 1}

y_actual = []
y_test = []

y_actual = np.array(y_actual)
y_test = np.array(y_test)

from sklearn.metrics import confusion_matrix

cm = confusion_matrix(y_actual, y_test)

```

 0s completed at 1:20 PM  