Predicting Lung Disease Unsing Deep Learning

Please download the dataset from the below url

https://www.kaggle.com/paultimothymooney/chest-xray-pneumonia

In [53]:
```
!pwd
```
```
/Users/mybeast/Documents
```

In [1]:
```
# import the libraries as shown below

from keras.layers import Input, Lambda, Dense, Flatten
from keras.models import Model

#we will create generic code which can be used for other base models as well
#from keras.applications.resnet50 import ResNet50
from keras.applications.vgg16 import VGG16
from keras.applications.vgg16 import preprocess_input
from keras.preprocessing import image
from keras.preprocessing.image import ImageDataGenerator
from keras.models import Sequential
import numpy as np
from glob import glob
import matplotlib.pyplot as plt
```

In [2]:
```
# re-size all the images to this
IMAGE_SIZE = [224, 224]

train_path = 'Datasets/train'
valid_path = 'Datasets/test'
```

In [3]:
```
# Import the Vgg 16 library as shown below and add preprocessing layer to th
# Here we will be using imagenet weights

vgg = VGG16(input_shape=IMAGE_SIZE + [3], weights='imagenet', include_top=Fa
```
```
Downloading data from https://storage.googleapis.com/tensorflow/keras-applic
ations/vgg16/vgg16_weights_tf_dim_ordering_tf_kernels_notop.h5
58892288/58889256 [==============================] - 26s 0us/step
58900480/58889256 [==============================] - 26s 0us/step
```

In [4]:
```
# don't train existing weights
for layer in vgg.layers:
    layer.trainable = False
```

In [5]:
```
  # useful for getting number of output classes in order to kno how many out
folders = glob('Datasets/train/*')
```

In [6]:

```
# our layers - you can add more if you want
x = Flatten()(vgg.output)
```

In [7]:

```
prediction = Dense(len(folders), activation='softmax')(x)

# create a model object
model = Model(inputs=vgg.input, outputs=prediction) #create a model with vgg
```

In [8]:

```
# view the structure of the model
model.summary()
```

```
Model: "model"
_________________________________________________________________
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         
_________________________________________________________________
dense (Dense)                (None, 2)                 50178     
=================================================================
Total params: 14,764,866
Trainable params: 50,178
Non-trainable params: 14,714,688
_________________________________________________________________
```

In [9]:

```python
# compile model
model.compile(
  loss='categorical_crossentropy',
  optimizer='adam',
  metrics=['accuracy']
)
```

In [10]:

```
# Use the Image Data Generator to import the images from the dataset
from keras.preprocessing.image import ImageDataGenerator

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

test_datagen = ImageDataGenerator(rescale = 1./255)
```

In [11]:

```
# Make sure you provide the same target size as initialied for the image siz
training_set = train_datagen.flow_from_directory('Datasets/train',
                                                 target_size = (224, 224),
                                                 batch_size = 32,
                                                 class_mode = 'categorical')
```

```
Found 5216 images belonging to 2 classes.
```

In [12]:

```
test_set = test_datagen.flow_from_directory('Datasets/test',
                                            target_size = (224, 224),
                                            batch_size = 32,
                                            class_mode = 'categorical')
```

```
Found 624 images belonging to 2 classes.
```

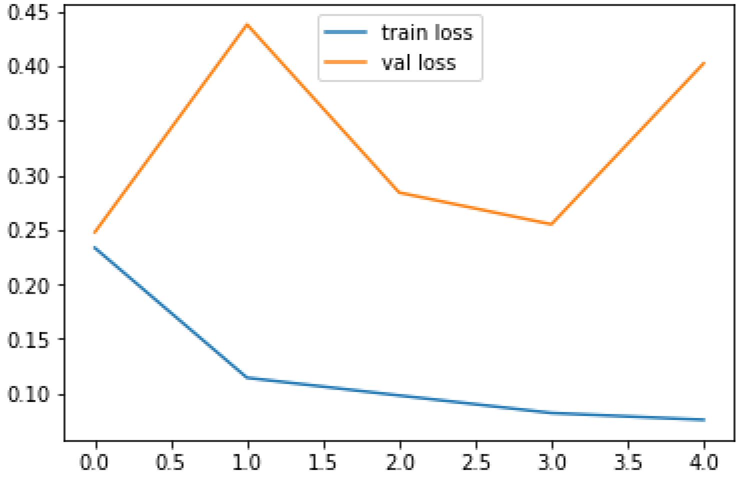
In [13]:

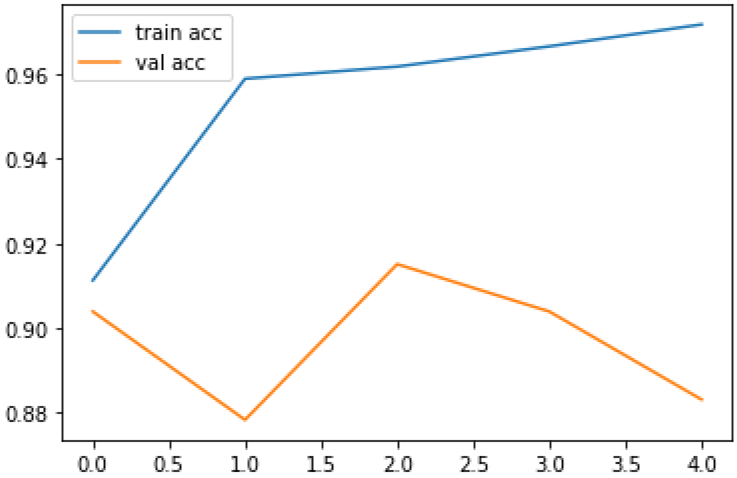
```
# fit the model
# Run the cell. It will take some time to execute
r = model.fit_generator(
  training_set,
  validation_data=test_set,
  epochs=5,
  steps_per_epoch=len(training_set),
  validation_steps=len(test_set)
)
```

```
/Users/mybeast/opt/anaconda3/lib/python3.8/site-packages/keras/engine/traini
ng.py:1972: UserWarning: `Model.fit_generator` is deprecated and will be rem
oved in a future version. Please use `Model.fit`, which supports generators.
  warnings.warn('`Model.fit_generator` is deprecated and '
Epoch 1/5
163/163 [==============================] - 3461s 21s/step - loss: 0.2333 - a
ccuracy: 0.9112 - val_loss: 0.2477 - val_accuracy: 0.9038
Epoch 2/5
163/163 [==============================] - 2407s 15s/step - loss: 0.1143 - a
ccuracy: 0.9590 - val_loss: 0.4380 - val_accuracy: 0.8782
Epoch 3/5
163/163 [==============================] - 2128s 13s/step - loss: 0.0981 - a
ccuracy: 0.9618 - val_loss: 0.2839 - val_accuracy: 0.9151
Epoch 4/5
163/163 [==============================] - 2122s 13s/step - loss: 0.0820 - a
ccuracy: 0.9666 - val_loss: 0.2549 - val_accuracy: 0.9038
Epoch 5/5
163/163 [==============================] - 2100s 13s/step - loss: 0.0758 - a
ccuracy: 0.9718 - val_loss: 0.4023 - val_accuracy: 0.8830
```

In [17]:

```
# plot the loss
plt.plot(r.history['loss'], label='train loss')
plt.plot(r.history['val_loss'], label='val loss')
plt.legend()
plt.show()
plt.savefig('LossVal_loss')

# plot the accuracy
plt.plot(r.history['accuracy'], label='train acc')
plt.plot(r.history['val_accuracy'], label='val acc')
plt.legend()
plt.show()
plt.savefig('AccVal_acc')
```





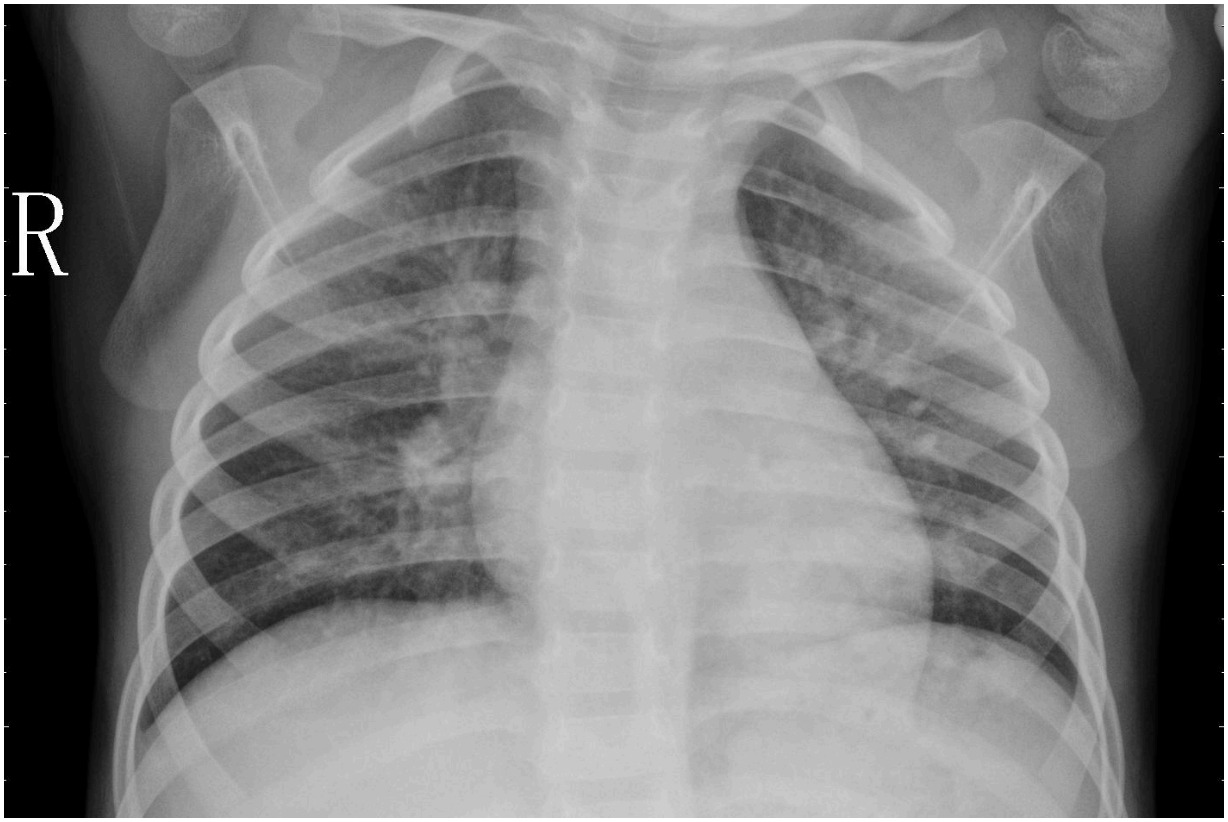
```
<Figure size 432x288 with 0 Axes>
```

In [15]:

```
# save it as a h5 file

import tensorflow as tf

from keras.models import load_model

model.save('model_vgg16.h5')
```

In [80]:

```
from IPython.display import display
from PIL import Image


NeumonialPath="Datasets/val/PNEUMONIA/person1949_bacteria_4880.jpeg"
# NormalPath = "Datasets/val/NORMAL/NORMAL2-IM-1431-0001.jpeg"
display(Image.open(NeumonialPath))
```



In [81]:

```
from tensorflow.keras.models import load_model
import numpy as np


model = load_model('model_vgg16.h5')

img = image.load_img(NeumonialPath,target_size=(224, 224))

x = image.img_to_array(img)
x = np.expand_dims(x,axis=0)
img_data = preprocess_input(x)
classes = model.predict(img_data)
print(classes)
if classes[0][0] > classes[0][1]:
    print('X-Ray image is NORMAL')
else:
    print('X-Ray image is Having NEUMONIAL')
```

```
[[0. 1.]]
X-Ray image is Having NEUMONIAL
```

In [ ]:

This notebook was converted with convert.ploomber.io