APPENDIX

```
from google.colab import drive
drive.mount('/content/drive')
!unzip /content/drive/MyDrive/archive.zip_dl=0
import numpy as np
import matplotlib.pyplot as plt
import keras
import pandas
from keras.preprocessing.image import img_to_array
import os
from keras.preprocessing.image import load_img
from keras.preprocessing.image import ImageDataGenerator
from keras.applications.vgg19 import VGG19,preprocess_input,decode_predictions
training_data_generator= ImageDataGenerator(zoom_range=0.5, shear_range=0.3, rescale=1/255, horizontal_flip=True)
validation_data_generator= ImageDataGenerator(rescale= 1/255)
train = training_data_generator.flow_from_directory(directory="/content/new plant diseases dataset(augmented)/New Plant Diseases Dataset(Augmented)/train",target_size=(256,256),batch_size=32)
val = validation_data_generator.flow_from_directory(directory="/content/new plant diseases dataset(augmented)/New Plant Diseases Dataset(Augmented)/valid",target_size=(256,256),batch_size=32)
from keras.layers import Dense, Flatten
from keras.models import Model
from keras.applications.vgg19 import VGG19
import keras
base_model =VGG19(input_shape=(256,256,3),include_top=False)
for layer in base_model.layers:
  layer.trainable=False
x =Flatten()(base_model.output)
x= Dense(units=38, activation='softmax')(x)
model =Model(base_model.input, x)
model.compile(optimizer='adam',loss=keras.losses.categorical_crossentropy,metrics=['accuracy'])
from keras.callbacks import ModelCheckpoint, EarlyStopping
es =EarlyStopping(monitor='val_accuracy',min_delta=0.01,patience=3,verbose=1)
```

```
mc =ModelCheckpoint(filepath="best_model.h",monitor='val_accuracy',min_delta=0.01,patience=3,verbose=1,save_best_only=True)
cb=[es,mc]
his = model.fit_generator(train,steps_per_epoch=16,epochs=50,verbose=1,callbacks=cb,validation_data=val,validation_steps=16)
from keras.callbacks import ModelCheckpoint, EarlyStopping
es =EarlyStopping(monitor='val_accuracy',min_delta=0.01,patience=3,verbose=1)
mc =ModelCheckpoint(filepath="best_model.h",monitor='val_accuracy',min_delta=0.01,patience=3,verbose=1,save_best_only=True)
cb=[es,mc]
from keras.models import load_model
model=load_model('/content/best_model.h')
acc =model.evaluate_generator(val)[1]
print(acc)
ref=dict(zip(list(train.class_indices.values()),list(train.class_indices.keys())))
def prediction(path):
  img=load_img(path,target_size=(256,256))
  i=img_to_array(img)
  im=preprocess_input(i)
  img=np.expand_dims(im,axis=0)
  pred =np.argmax(model.predict(img))
  print(pred)
  print(f"The plant diagnosed as{ref[pred]}")
  path="/content/drive/MyDrive/precaution/"+f'{pred}'+".txt"
  f=open(path)
  print(f.read())
```