

Eyes Diseases classifiction using MobileNetV3

```
In [1]: #import data by kaggle
!mkdir -p ~/.kaggle
!cp kaggle.json ~/.kaggle/
```

```
In [2]: #kaggle api
!kaggle datasets download -d gunavenkatdoddi/eye-diseases-classific
```

Warning: Your Kaggle API key is readable by other users on this system! To fix this, you can run 'chmod 600 /root/.kaggle/kaggle.json'

Downloading eye-diseases-classification.zip to /content
100% 734M/736M [00:23<00:00, 40.1MB/s]
100% 736M/736M [00:23<00:00, 32.6MB/s]

```
In [3]: #file unzip
import zipfile
zip_ref = zipfile.ZipFile('/content/eye-diseases-classification.zip')
zip_ref.extractall('/content/Data')
zip_ref.close()
```

```
In [4]: #importing the libery
import pandas as pd
import numpy as np
from tensorflow import keras
import matplotlib.pyplot as plt
import tensorflow as tf
from keras.models import Sequential
from keras.layers import Conv2D,MaxPool2D,Dropout,Dense,Flatten,Max
from keras.callbacks import EarlyStopping
```

```
In [5]: #dataset path
path = "/content/Data/dataset"
```

In [6]: *#dataset splitting dataset train and test*

```
train_data=tf.keras.preprocessing.image_dataset_from_directory(path,
                                                                image_size=(180, 180),
                                                                batch_size=32,
                                                                subset="training",
                                                                seed=123)

test_data=tf.keras.preprocessing.image_dataset_from_directory(path,
                                                             image_size=(180, 180),
                                                             batch_size=32,
                                                             subset="validation",
                                                             seed=123)
```

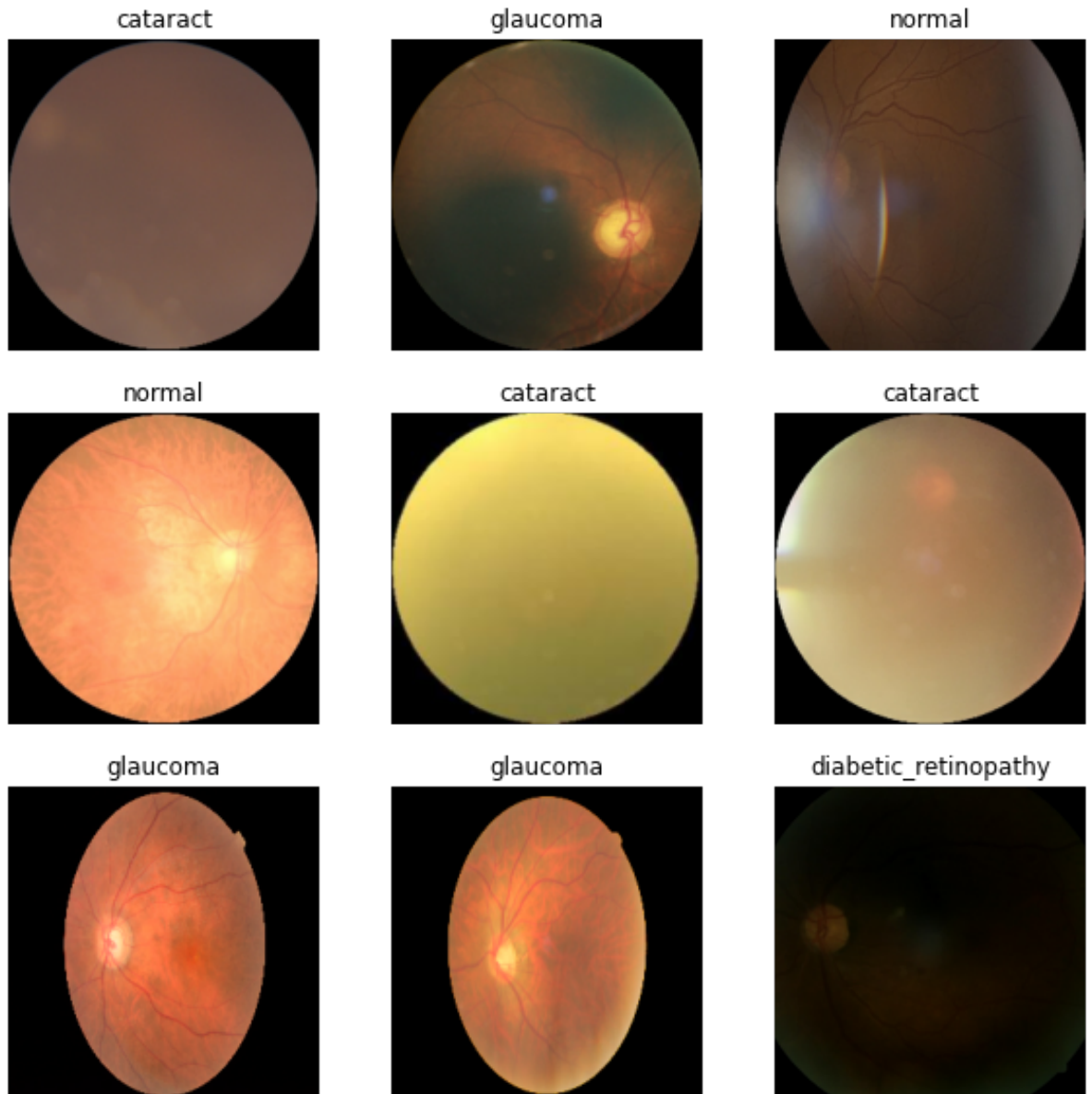
Found 4217 files belonging to 4 classes.
Using 3374 files for training.
Found 4217 files belonging to 4 classes.
Using 843 files for validation.

In [7]: *#check class*

```
class_names = train_data.class_names
class_names
```

Out[7]: ['cataract', 'diabetic_retinopathy', 'glaucoma', 'normal']

```
In [8]: #dataset plot
plt.figure(figsize=(10, 10))
for images, labels in train_data.take(1):
    for i in range(9):
        ax = plt.subplot(3, 3, i+1)
        plt.imshow(images[i].numpy().astype('uint8'))
        plt.title(class_names[labels[i]])
        plt.axis('off')
```



```
In [9]: # Criando o modelo base em cima do modelo MobileNetV3
base_model = keras.applications.MobileNetV3Small(input_shape=(224,
                                                         classes=400,
                                                         include_top=False,
                                                         weights='imagenet')
```

Downloading data from https://storage.googleapis.com/tensorflow/keras-applications/mobilenet_v3/weights_mobilenet_v3_small_224_1.0_float_no_top_v2.h5
 (https://storage.googleapis.com/tensorflow/keras-applications/mobilenet_v3/weights_mobilenet_v3_small_224_1.0_float_no_top_v2.h5)
 4334752/4334752 [=====] - 0s 0us/step

```
In [10]: # Freeze convolutional base
base_model.trainable = False
base_model.summary()
```

```
expanded_conv/depthwise/BatchN (None, 56, 56, 16) 64 [
'expanded_conv/depthwise[0][0]']
orm (BatchNormalization)

re_lu_1 (ReLU) (None, 56, 56, 16) 0 [
'expanded_conv/depthwise/BatchNo
r
m[0][0]']

expanded_conv/squeeze_excite/A (None, 1, 1, 16) 0 [
're_lu_1[0][0]']
vgPool (GlobalAveragePooling2D
)

expanded_conv/squeeze_excite/C (None, 1, 1, 8) 136 [
'expanded_conv/squeeze_excite/Av
onv (Conv2D)
g
Pool[0][0]']
```

```
In [11]: #data augmentation
data_augmentation = keras.models.Sequential([
    keras.layers.RandomFlip('horizontal'),
    keras.layers.RandomRotation(0.2)
])
```

```
In [12]: num_classes = len(class_names)# 7

inputs = keras.Input(shape=(224, 224, 3))
#x = data_augmentation(inputs)
x = keras.applications.mobilenet_v3.preprocess_input(inputs)
x = base_model(x, training=False)
x = keras.layers.GlobalAveragePooling2D()(x)
x = keras.layers.Dropout(0.2)(x)

outputs = keras.layers.Dense(num_classes, activation='softmax')(x)
model = keras.Model(inputs, outputs)
```

```
In [13]: #compile model
model.compile(optimizer='adam',
              loss='sparse_categorical_crossentropy',
              metrics=['accuracy'])
model.summary()
```

Model: "model"

Layer (type)	Output Shape	Param #
input_2 (InputLayer)	[(None, 224, 224, 3)]	0
MobilenetV3small (Functiona l)	(None, 7, 7, 576)	939120
global_average_pooling2d (G lobalAveragePooling2D)	(None, 576)	0
dropout (Dropout)	(None, 576)	0
dense (Dense)	(None, 4)	2308
Total params: 941,428		
Trainable params: 2,308		
Non-trainable params: 939,120		

In [14]:

```
#fitting model
initial_epochs = 15

early_stop = keras.callbacks.EarlyStopping(patience=1, restore_best_weights=True)

history = model.fit(train_data,
                    validation_data=test_data,
                    epochs=initial_epochs,
                    callbacks=[early_stop])
```

```
Epoch 1/15
106/106 [=====] - 33s 211ms/step - loss: 0.9354 - accuracy: 0.5972 - val_loss: 0.5884 - val_accuracy: 0.7829
Epoch 2/15
106/106 [=====] - 21s 181ms/step - loss: 0.6164 - accuracy: 0.7564 - val_loss: 0.4845 - val_accuracy: 0.8197
Epoch 3/15
106/106 [=====] - 20s 180ms/step - loss: 0.5302 - accuracy: 0.7958 - val_loss: 0.4343 - val_accuracy: 0.8363
Epoch 4/15
106/106 [=====] - 21s 190ms/step - loss: 0.4911 - accuracy: 0.8148 - val_loss: 0.4029 - val_accuracy: 0.8600
Epoch 5/15
106/106 [=====] - 21s 185ms/step - loss: 0.4522 - accuracy: 0.8308 - val_loss: 0.3836 - val_accuracy: 0.8636
Epoch 6/15
106/106 [=====] - 21s 190ms/step - loss: 0.4329 - accuracy: 0.8394 - val_loss: 0.3650 - val_accuracy: 0.8695
Epoch 7/15
106/106 [=====] - 21s 182ms/step - loss: 0.4200 - accuracy: 0.8394 - val_loss: 0.3613 - val_accuracy: 0.8671
Epoch 8/15
106/106 [=====] - 22s 194ms/step - loss: 0.3982 - accuracy: 0.8477 - val_loss: 0.3467 - val_accuracy: 0.8802
Epoch 9/15
106/106 [=====] - 23s 205ms/step - loss: 0.3849 - accuracy: 0.8557 - val_loss: 0.3372 - val_accuracy: 0.8778
Epoch 10/15
106/106 [=====] - 21s 184ms/step - loss: 0.3713 - accuracy: 0.8675 - val_loss: 0.3280 - val_accuracy: 0.8873
Epoch 11/15
106/106 [=====] - 21s 185ms/step - loss: 0.3605 - accuracy: 0.8598 - val_loss: 0.3204 - val_accuracy: 0.889
```

```

7
Epoch 12/15
106/106 [=====] - 21s 183ms/step - loss:
0.3542 - accuracy: 0.8669 - val_loss: 0.3185 - val_accuracy: 0.888
5
Epoch 13/15
106/106 [=====] - 22s 193ms/step - loss:
0.3471 - accuracy: 0.8696 - val_loss: 0.3104 - val_accuracy: 0.894
4
Epoch 14/15
106/106 [=====] - 21s 184ms/step - loss:
0.3422 - accuracy: 0.8717 - val_loss: 0.3057 - val_accuracy: 0.907
5
Epoch 15/15
106/106 [=====] - 21s 185ms/step - loss:
0.3373 - accuracy: 0.8779 - val_loss: 0.3009 - val_accuracy: 0.905
1

```

```

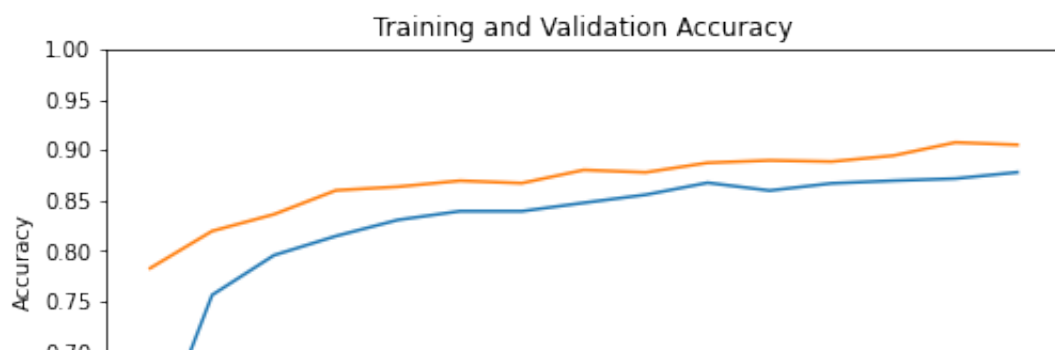
In [15]: #check accuracy score and loss
acc = history.history['accuracy']
val_acc = history.history['val_accuracy']

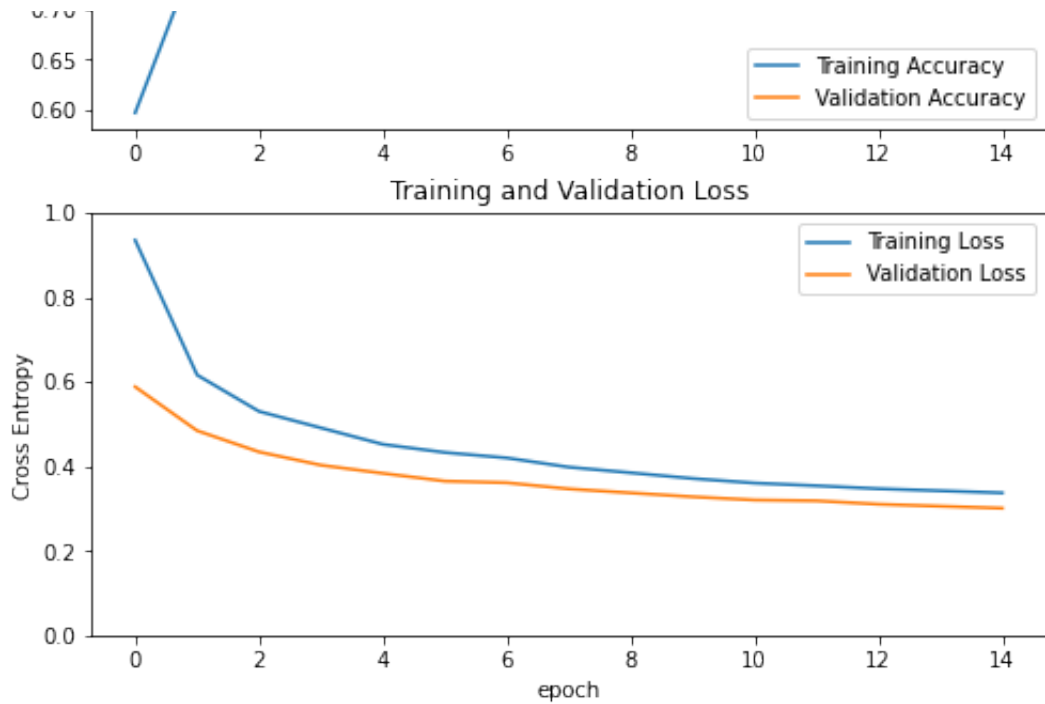
loss = history.history['loss']
val_loss = history.history['val_loss']

plt.figure(figsize=(8, 8))
plt.subplot(2, 1, 1)
plt.plot(acc, label='Training Accuracy')
plt.plot(val_acc, label='Validation Accuracy')
plt.legend(loc='lower right')
plt.ylabel('Accuracy')
plt.ylim([min(plt.ylim()), 1])
plt.title('Training and Validation Accuracy')

plt.subplot(2, 1, 2)
plt.plot(loss, label='Training Loss')
plt.plot(val_loss, label='Validation Loss')
plt.legend(loc='upper right')
plt.ylabel('Cross Entropy')
plt.ylim([0, 1.0])
plt.title('Training and Validation Loss')
plt.xlabel('epoch')
plt.show()

```

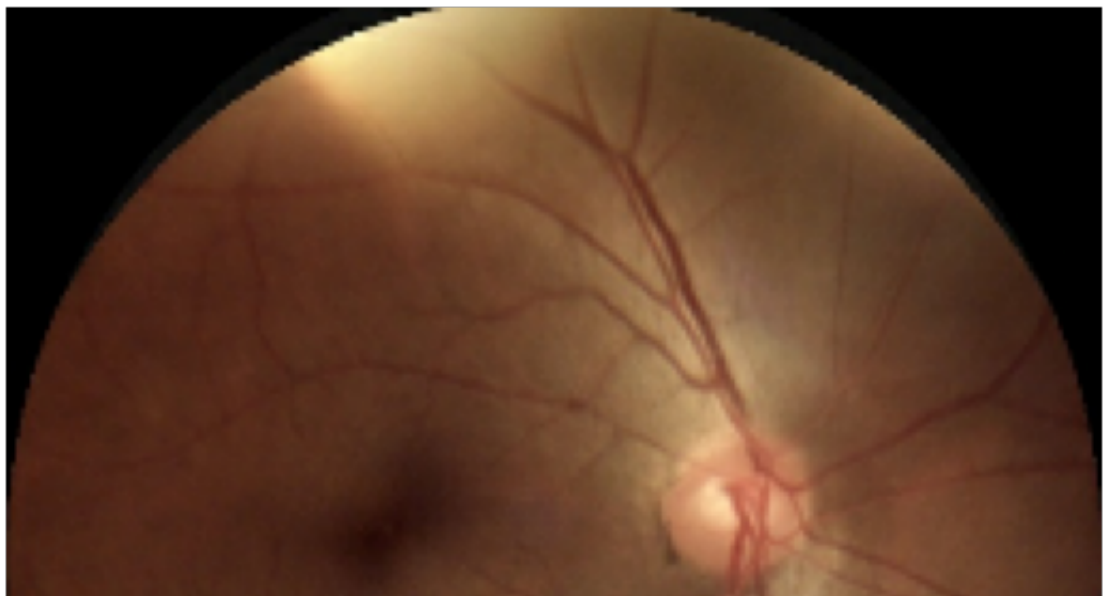




```
In [16]: #check over model
plt.figure(figsize=(10, 100))
for images, labels in test_data.take(1):
    prediction = model.predict(images, batch_size=32)
    for i in range(9):
        ax = plt.subplot(9, 1, i+1)
        pred = np.argmax(prediction[i])
        plt.imshow(images[i].numpy().astype('uint8'))
        plt.title(f'Predito: {class_names[pred]} - Real: {class_names[labels[i]]}')
        plt.axis('off')
```

1/1 [=====] - 1s 757ms/step

Predito: normal - Real: normal




```
In [18]: #Visualize the result
results = model.evaluate(test_data, verbose=0)
```

```
In [19]: print("Test Loss: {:.5f}".format(results[0]))
print("Accuracy on the test set: {:.2f}%".format(results[1] * 100))
```

Test Loss: 0.30095
Accuracy on the test set: 90.51%

```
In [27]: #model save
model.save('/content/drive/MyDrive/Colab Notebooks/Eyes_disease.h5')
```