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 sy
stem! To fix this, you can run 'chmod 600 /root/.kaggle/kaggle.jso
n'
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"
```

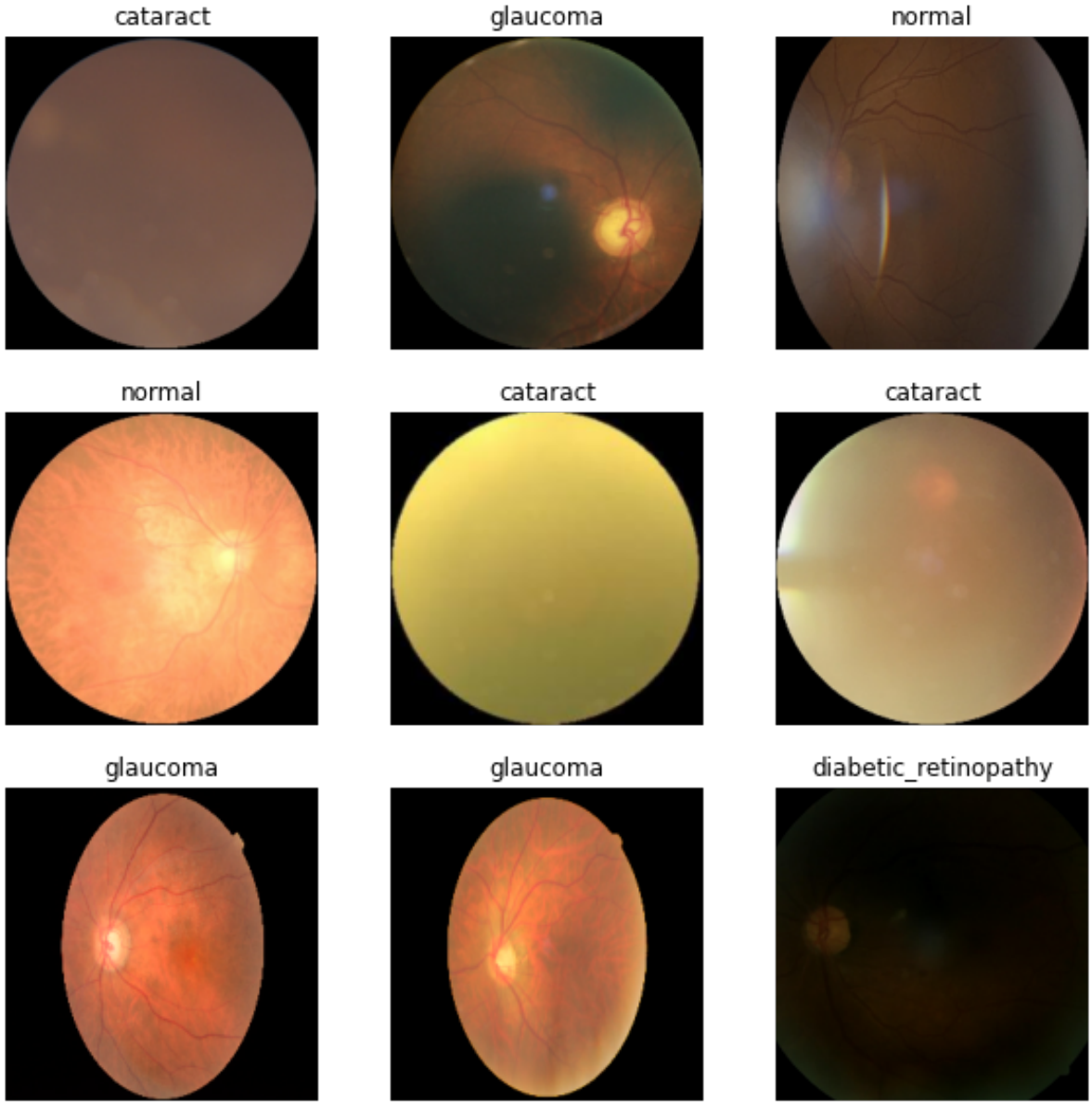
In [6]:
```
#dataset spliting dataset train and test
train_data=tf.keras.preprocessing.image_dataset_from_directory(path
                                                               imag
                                                               batc
                                                               subs
                                                               seed


test_data=tf.keras.preprocessing.image_dataset_from_directory(path,
                                                               imag
                                                               batc
                                                               subs
                                                               seed
```

```
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  (None, 7, 7, 576)        939120
 l)

 global_average_pooling2d (G  (None, 576)              0
 lobalAveragePooling2D)

 dropout (Dropout)           (None, 576)               0

 dense (Dense)               (None, 4)                 2308

=================================================================
Total params: 941,428
Trainable params: 2,308
Non-trainable params: 939,120
_________________________________________________________________
```

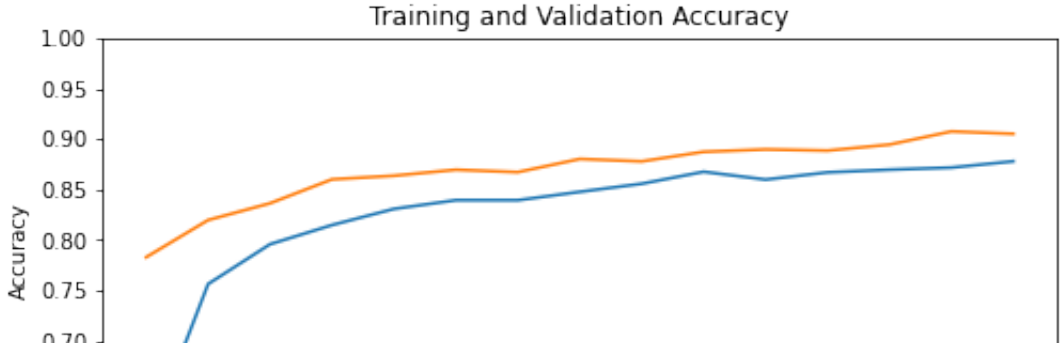
In [14]:

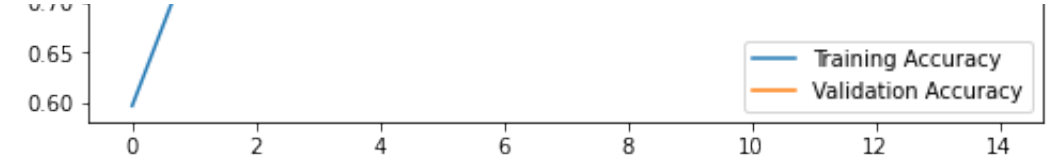
```
#fitting model
initial_epochs = 15

early_stop = keras.callbacks.EarlyStopping(patience=1, restore_best

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

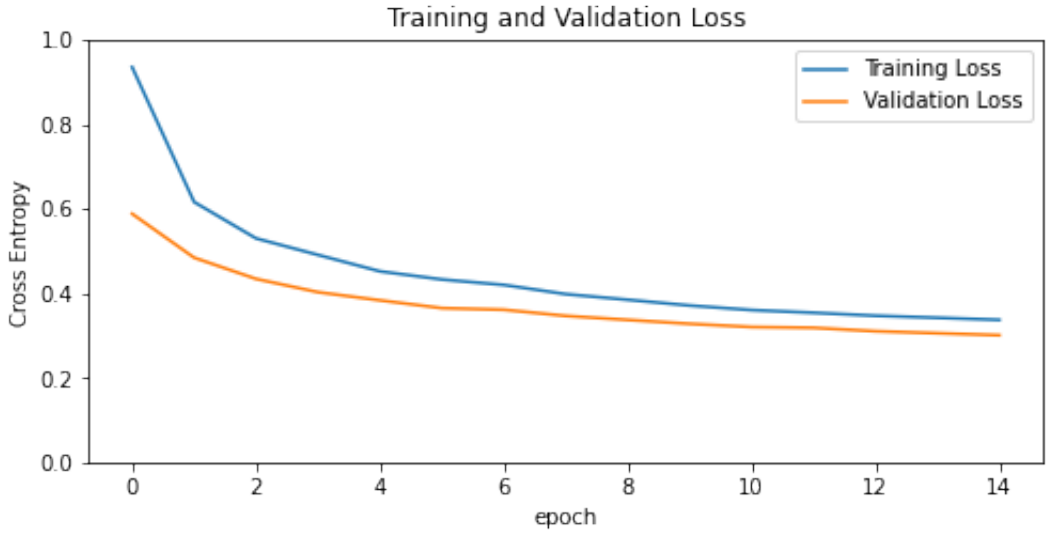
```
Epoch 1/15
106/106 [==============================] - 33s 211ms/step - loss:
0.9354 - accuracy: 0.5972 - val_loss: 0.5884 - val_accuracy: 0.782
9
Epoch 2/15
106/106 [==============================] - 21s 181ms/step - loss:
0.6164 - accuracy: 0.7564 - val_loss: 0.4845 - val_accuracy: 0.819
7
Epoch 3/15
106/106 [==============================] - 20s 180ms/step - loss:
0.5302 - accuracy: 0.7958 - val_loss: 0.4343 - val_accuracy: 0.836
3
Epoch 4/15
106/106 [==============================] - 21s 190ms/step - loss:
0.4911 - accuracy: 0.8148 - val_loss: 0.4029 - val_accuracy: 0.860
0
Epoch 5/15
106/106 [==============================] - 21s 185ms/step - loss:
0.4522 - accuracy: 0.8308 - val_loss: 0.3836 - val_accuracy: 0.863
6
Epoch 6/15
106/106 [==============================] - 21s 190ms/step - loss:
0.4329 - accuracy: 0.8394 - val_loss: 0.3650 - val_accuracy: 0.869
5
Epoch 7/15
106/106 [==============================] - 21s 182ms/step - loss:
0.4200 - accuracy: 0.8394 - val_loss: 0.3613 - val_accuracy: 0.867
1
Epoch 8/15
106/106 [==============================] - 22s 194ms/step - loss:
0.3982 - accuracy: 0.8477 - val_loss: 0.3467 - val_accuracy: 0.880
2
Epoch 9/15
106/106 [==============================] - 23s 205ms/step - loss:
0.3849 - accuracy: 0.8557 - val_loss: 0.3372 - val_accuracy: 0.877
8
Epoch 10/15
106/106 [==============================] - 21s 184ms/step - loss:
0.3713 - accuracy: 0.8675 - val_loss: 0.3280 - val_accuracy: 0.887
3
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 accurcy 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()
```

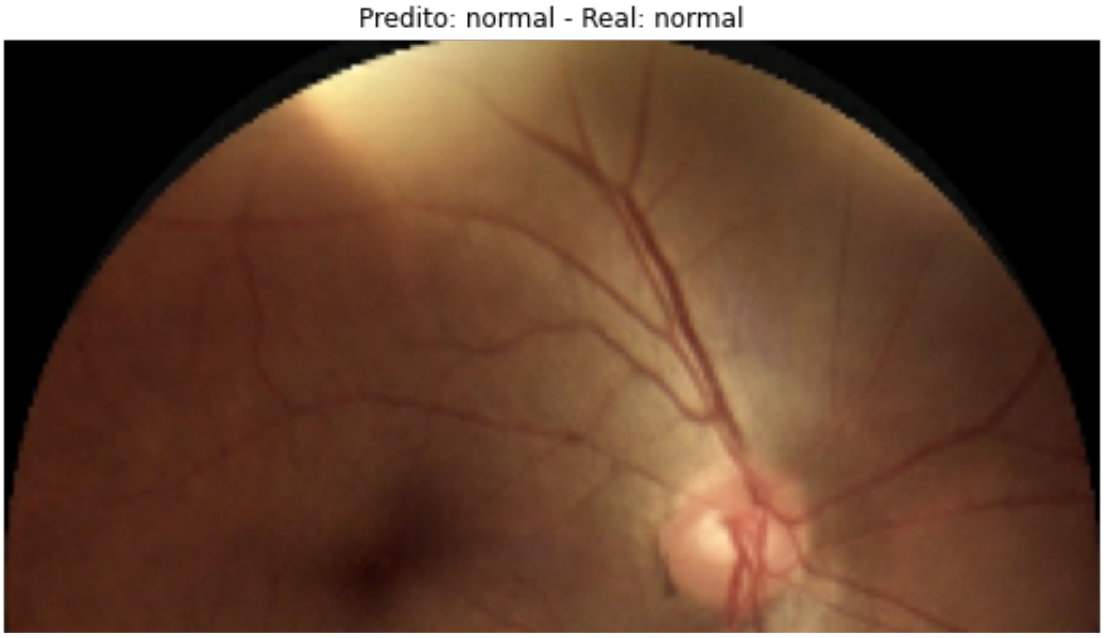






In [16]:
```
#check over model
plt.figure(figsize=(10, 100))
for images, labels in test_data.take(1):
    prediction = model.predict(images,batch_size=32)
    for i in range(9):
        ax = plt.subplot(9, 1, i+1)
        pred = np.argmax(prediction[i])
        plt.imshow(images[i].numpy().astype('uint8'))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

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



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_diease.h5')
```