Importing required libraries

In [18]:

```
import numpy as np
import pandas as pd
import os
import matplotlib.pyplot as plt
import tensorflow as tf
from tensorflow.keras import layers
from tensorflow.keras.optimizers import Adam
from tensorflow.keras.losses import sparse_categorical_crossentropy
```

Making seperate directories

seperate directories are being made that have fake/forgery and real images

In [19]:

```
!mkdir Train_
!mkdir Test_

!mkdir Train_/Fake
!mkdir Train_/Real

!mkdir Test_/Fake
!mkdir Test_/Real
```

```
mkdir: cannot create directory ‘Train_’: File exists
mkdir: cannot create directory ‘Test_’: File exists
mkdir: cannot create directory ‘Train_/Fake’: File exists
mkdir: cannot create directory ‘Train_/Real’: File exists
mkdir: cannot create directory ‘Test_/Fake’: File exists
mkdir: cannot create directory ‘Test_/Real’: File exists
```

Repositioning train and test data

You can view real and fake directories in output.

In [20]:

```
path = "/kaggle/input/updateddata/sign_data/train/"

for i in os.listdir(path):
    contol = i.split("_")
    try:
        if contol[1]=="forg":
            os.system("cp -r {} Train_/Fake".format(path+i))
    except:
        os.system("cp -r {} Train_/Real".format(path+i))
```

In [21]:

```
path = "/kaggle/input/updateddata/sign_data/test/"

for i in os.listdir(path):
    contol = i.split("_")
    try:
        if contol[1]=="forg":
            os.system("cp -r {} Test_/Fake".format(path+i))
    except:
        os.system("cp -r {} Test_/Real".format(path+i))
```

In [22]:

```
batch_size = 30
img_height = 256
img_width = 256
```

Loading the train and test data

In [23]:

```
# # loading training data
training_ds = tf.keras.preprocessing.image_dataset_from_directory(
    os.path.join("/kaggle/working/Train_"),
    seed=42,
    image_size=(img_height, img_width),
    color_mode = 'rgb',
    batch_size=batch_size
)
```

```
Found 1149 files belonging to 2 classes.
```

In [24]:

```
# # loading testing data

testing_ds = tf.keras.preprocessing.image_dataset_from_directory(
     os.path.join("/kaggle/working/Test_"),
    seed=42,
    image_size=(img_height, img_width),
    color_mode = 'rgb',
    batch_size=batch_size
)
```

```
Found 500 files belonging to 2 classes.
```

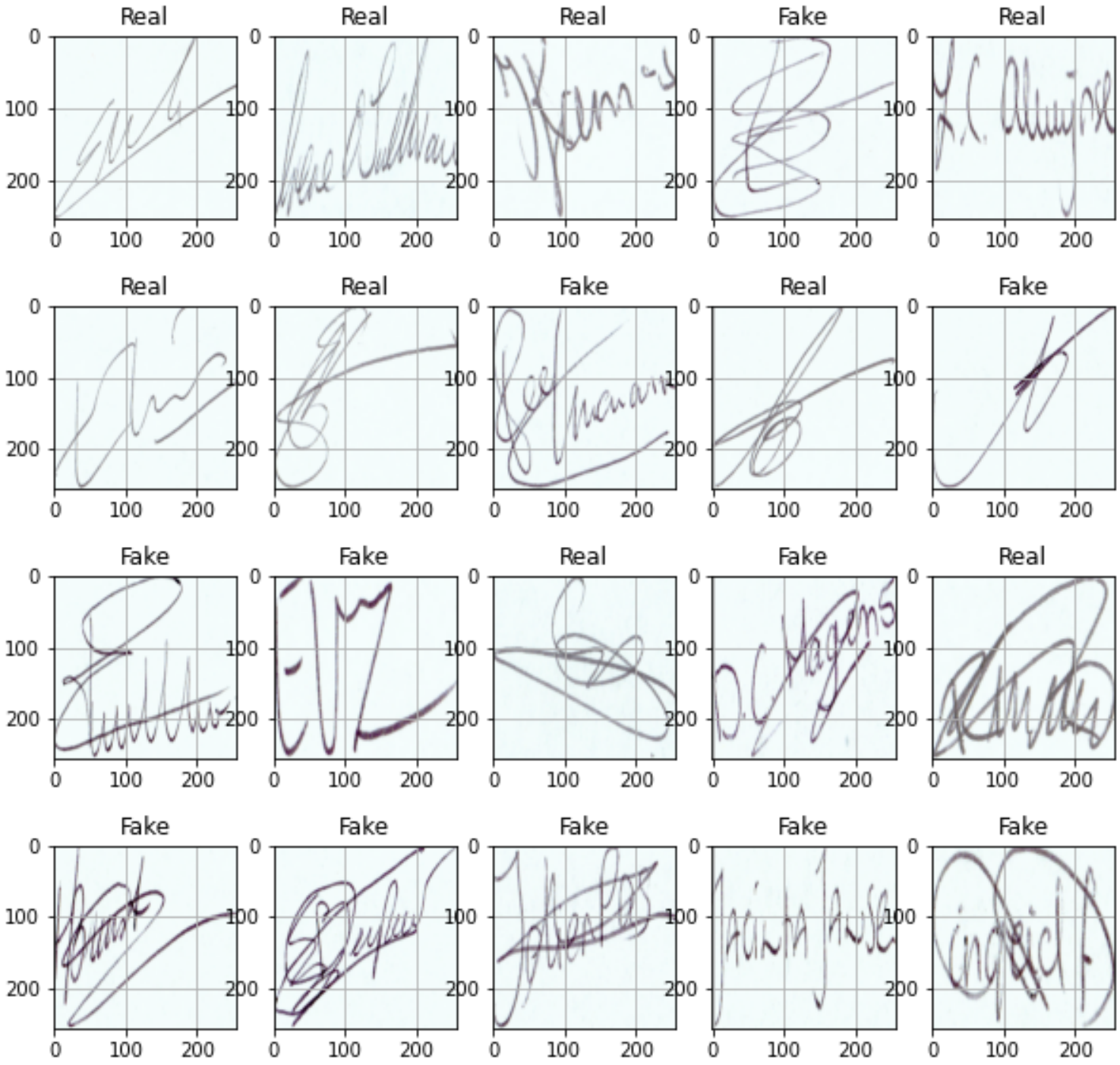
Images in our training data

In [25]:

```
class_names = training_ds.class_names
plt.figure(figsize=(10, 10))
for images, labels in training_ds.take(1):
    for i in range(20):
        ax = plt.subplot(4, 5, i + 1)
        plt.imshow(images[i].numpy().astype("uint8"))
        # print(images[i])
        plt.title(class_names[labels[i]])
        plt.grid(True)
```

```
2022-04-04 07:37:27.583059: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:27.677421: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:27.703413: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:27.753053: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:27.763247: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:27.769865: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:27.841929: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:27.983675: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:28.024379: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:28.040911: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:28.091940: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:28.100413: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
```

```
2022-04-04 07:37:28.145926: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:28.180600: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
```


Real
Real
Real
Fake
Real
Real
Real
Fake
Real
Fake
Fake
Fake
Real
Fake
Real
Fake
Fake
Fake
Fake
Fake

Configuring dataset for performance

In [26]:
```
AUTOTUNE = tf.data.experimental.AUTOTUNE
training_ds = training_ds.cache().prefetch(buffer_size=AUTOTUNE)
testing_ds = testing_ds.cache().prefetch(buffer_size=AUTOTUNE)
```

Our CNN Model

In [27]:

```
MyCnn = tf.keras.models.Sequential([
    layers.experimental.preprocessing.Rescaling(1./255),
    layers.Conv2D(32, 3, activation='relu'),
    layers.AveragePooling2D(),
    layers.Conv2D(64, 3, activation='relu'),
     layers.MaxPooling2D(),
#     layers.Conv2D(128, 3, activation='relu'),
#      layers.AveragePooling2D(),
#     layers.Conv2D(256, 3, activation='relu'),
#      layers.MaxPooling2D(),
#     layers.Conv2D(512, 3, activation='relu'),
#      layers.MaxPooling2D(),

    layers.GlobalAveragePooling2D(),
    layers.Dense(64, activation='relu'),
    layers.Dense(len(class_names), activation='sigmoid')
])
```

In [28]:

```
MyCnn.compile(optimizer=Adam(learning_rate=0.0005),
              loss='sparse_categorical_crossentropy', metrics=['accuracy'])
```

Training our model

In [29]:

```
retVal = MyCnn.fit(training_ds, validation_data=testing_ds, epochs=20)
```

```
Epoch 1/20

2022-04-04 07:37:30.834420: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:30.925522: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:30.952528: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:31.002052: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:31.009638: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:31.018954: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:31.089807: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:31.233320: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:31.275386: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile

 1/39 [..............................] - ETA: 39s - loss: 0.6764 - accuracy: 0.6000
```

```
2022-04-04 07:37:31.293772: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:31.344002: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:31.352061: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:31.397141: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:31.431378: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:31.464912: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:31.480142: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:31.491681: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile

 3/39 [=>............................] - ETA: 3s - loss: 0.6985 - accuracy: 0.5333
```

```
2022-04-04 07:37:31.526854: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:31.532019: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:31.707135: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile

 8/39 [=====>........................] - ETA: 2s - loss: 0.6968 - accuracy: 0.5250

2022-04-04 07:37:31.976497: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:32.022090: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile

12/39 [========>.....................] - ETA: 2s - loss: 0.6952 - accuracy: 0.5250
```

```
2022-04-04 07:37:32.371011: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:32.446647: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:32.462391: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:32.534607: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile

15/39 [==========>...................] - ETA: 2s - loss: 0.6938 - accuracy: 0.5378

2022-04-04 07:37:32.588626: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:32.680429: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:32.789239: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile

17/39 [============>.................] - ETA: 2s - loss: 0.6934 - accuracy: 0.5373
```

```
2022-04-04 07:37:32.833201: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:32.845594: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:32.878404: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:32.943288: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:32.956086: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:32.956500: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile

22/39 [===============>.............] - ETA: 1s - loss: 0.6922 - accuracy: 0.5394
```

```
2022-04-04 07:37:33.211135: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:33.223387: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:33.266045: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:33.277317: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:33.285119: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile

25/39 [==================>.....] - ETA: 1s - loss: 0.6927 - accuracy: 0.53 - ETA: 1
s - loss: 0.6938 - accuracy: 0.5280

2022-04-04 07:37:33.454768: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:33.485562: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:33.578969: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:33.612577: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
```

```
27/39 [====================>.....] - ETA: 1s - loss: 0.6932 - accuracy: 0.5296

2022-04-04 07:37:33.660799: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:33.740627: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:33.774460: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:33.817114: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:33.827705: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:33.834722: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:33.837052: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile

30/39 [======================>.......] - ETA: 0s - loss: 0.6920 - accuracy: 0.5378
```

```
2022-04-04 07:37:33.893838: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:33.929293: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:33.968989: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:33.991194: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile

38/39 [============================>.] - ETA: 0s - loss: 0.6883 - accuracy: 0.5518
```

```
2022-04-04 07:37:34.448917: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:34.533092: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:34.561540: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:34.564742: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:34.573768: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:34.690365: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:34.743196: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:34.752298: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:34.786535: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:34.812794: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:34.850092: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:34.899512: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
```

```
2022-04-04 07:37:34.920393: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:34.935723: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:34.986914: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:35.020027: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:35.022694: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:35.030282: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:35.035250: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:35.044853: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:35.206688: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:35.249942: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:35.316180: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:35.350384: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:35.352973: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
```

```
own incorrect sRGB profile
2022-04-04 07:37:35.367729: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:35.369998: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:35.382975: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:35.502243: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:35.579345: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:35.636153: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:35.656411: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:35.733450: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:35.794577: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
2022-04-04 07:37:35.799382: W tensorflow/core/lib/png/png_io.cc:88] PNG warning: iCCP: kn
own incorrect sRGB profile
```

```
39/39 [==============================] - 6s 120ms/step - loss: 0.6880 - accuracy: 0.5527
- val_loss: 0.7052 - val_accuracy: 0.5040
Epoch 2/20
39/39 [==============================] - 1s 29ms/step - loss: 0.6849 - accuracy: 0.5527 -
val_loss: 0.6953 - val_accuracy: 0.5040
Epoch 3/20
39/39 [==============================] - 1s 29ms/step - loss: 0.6750 - accuracy: 0.5762 -
val_loss: 0.6890 - val_accuracy: 0.5040
Epoch 4/20
39/39 [==============================] - 1s 28ms/step - loss: 0.6539 - accuracy: 0.6310 -
val_loss: 0.6676 - val_accuracy: 0.5220
Epoch 5/20
39/39 [==============================] - 1s 29ms/step - loss: 0.6131 - accuracy: 0.7058 -
val_loss: 0.5876 - val_accuracy: 0.6860
Epoch 6/20
39/39 [==============================] - 1s 30ms/step - loss: 0.5455 - accuracy: 0.7685 -
val_loss: 0.5001 - val_accuracy: 0.7980
Epoch 7/20
39/39 [==============================] - 1s 29ms/step - loss: 0.4767 - accuracy: 0.8007 -
val_loss: 0.4335 - val_accuracy: 0.8340
Epoch 8/20
39/39 [==============================] - 1s 28ms/step - loss: 0.4237 - accuracy: 0.8207 -
val_loss: 0.3782 - val_accuracy: 0.8500
Epoch 9/20
```

```
39/39 [==============================] - 1s 28ms/step - loss: 0.3865 - accuracy: 0.8407 -
val_loss: 0.3439 - val_accuracy: 0.8560
Epoch 10/20
39/39 [==============================] - 1s 28ms/step - loss: 0.3600 - accuracy: 0.8538 -
val_loss: 0.3172 - val_accuracy: 0.8720
Epoch 11/20
39/39 [==============================] - 1s 28ms/step - loss: 0.3397 - accuracy: 0.8625 -
val_loss: 0.2980 - val_accuracy: 0.8720
Epoch 12/20
39/39 [==============================] - 1s 29ms/step - loss: 0.3237 - accuracy: 0.8677 -
val_loss: 0.2889 - val_accuracy: 0.8740
Epoch 13/20
39/39 [==============================] - 1s 28ms/step - loss: 0.3107 - accuracy: 0.8712 -
val_loss: 0.2820 - val_accuracy: 0.8740
Epoch 14/20
39/39 [==============================] - 1s 28ms/step - loss: 0.3010 - accuracy: 0.8764 -
val_loss: 0.2848 - val_accuracy: 0.8680
Epoch 15/20
39/39 [==============================] - 1s 29ms/step - loss: 0.2934 - accuracy: 0.8808 -
val_loss: 0.2889 - val_accuracy: 0.8680
Epoch 16/20
39/39 [==============================] - 1s 29ms/step - loss: 0.2842 - accuracy: 0.8869 -
val_loss: 0.2734 - val_accuracy: 0.8700
Epoch 17/20
39/39 [==============================] - 1s 28ms/step - loss: 0.2762 - accuracy: 0.8903 -
```

```
val_loss: 0.2554 - val_accuracy: 0.8900
Epoch 18/20
39/39 [==============================] - 1s 28ms/step - loss: 0.2681 - accuracy: 0.8964 -
val_loss: 0.2424 - val_accuracy: 0.8980
Epoch 19/20
39/39 [==============================] - 1s 28ms/step - loss: 0.2621 - accuracy: 0.9008 -
val_loss: 0.2310 - val_accuracy: 0.9060
Epoch 20/20
39/39 [==============================] - 1s 28ms/step - loss: 0.2560 - accuracy: 0.8999 -
val_loss: 0.2206 - val_accuracy: 0.9100
```

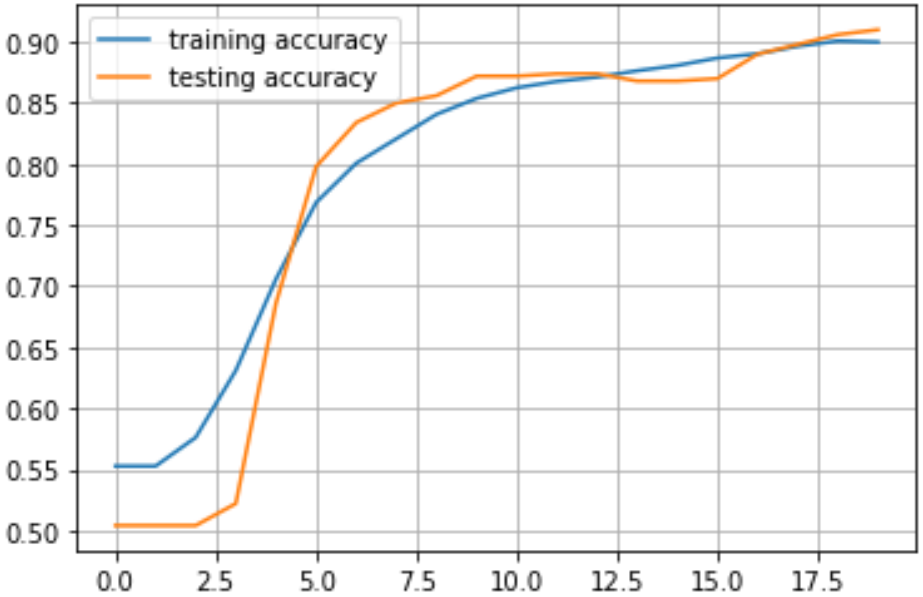
Plotting the training and testing accuracy

In [30]:

```
plt.plot(retVal.history['accuracy'], label='training accuracy')
plt.plot(retVal.history['val_accuracy'], label='testing accuracy')
plt.grid(True)
plt.legend()
```

Out[30]:

```
<matplotlib.legend.Legend at 0x7f1b819aa6d0>
```



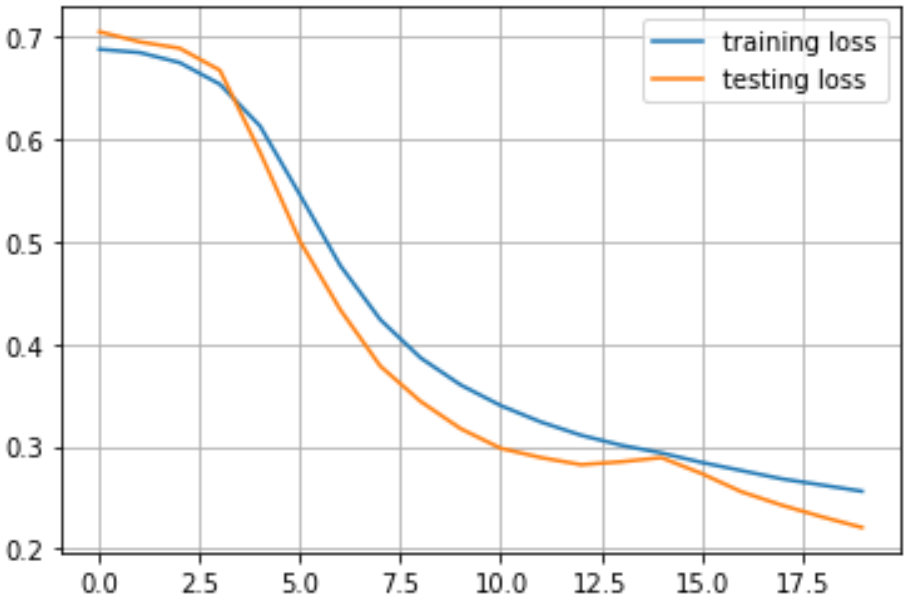
Plotting the training and testing loss

In [31]:

```
plt.plot(retVal.history['loss'], label='training loss')
plt.plot(retVal.history['val_loss'], label='testing loss')
plt.grid(True)
plt.legend()
```

Out[31]:

```
<matplotlib.legend.Legend at 0x7f1b818e6150>
```



Printing Predicted Images

In [32]:

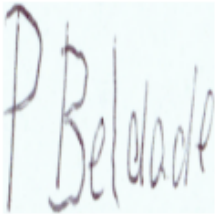
```
plt.figure(figsize=(20, 20))
for images, labels in testing_ds.take(1):
    print(len(images))
    print(labels)
    predictions = MyCnn.predict(images)
    predlabel = []

    for mem in predictions:
      # print(predictions)
      # print(mem)
      # print(np.argmax(mem))
      predlabel.append(class_names[np.argmax(mem)])

    for i in range(30):
        ax = plt.subplot(8, 5, i + 1)
        plt.imshow(images[i].numpy().astype("uint8"))
        plt.title('Predicted label:' + str(i) + predlabel[i])
        plt.axis('off')
        plt.grid(True)
```

```
30
tf.Tensor([0 1 1 1 0 1 0 0 0 0 0 1 1 1 0 1 0 1 0 0 1 1 0 0 0 1 0 0 1 1], shape=(30,), dty
pe=int32)
```

Predicted label:0Real



Predicted label:1Real

Predicted label:2Real

Predicted label:3Real

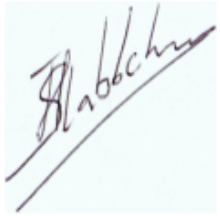
Predicted label:4Fake

Predicted label:5Real

Predicted label:6Fake

Predicted label:7Fake

Predicted label:8Fake



Predicted label:9Fake

Predicted label:10Fake

Predicted label:11Real

Predicted label:12Real

Predicted label:13Real

Predicted label:14Fake

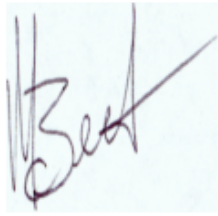
Predicted label:15Real

Predicted label:16Fake

Predicted label:17Real

Predicted label:18Fake

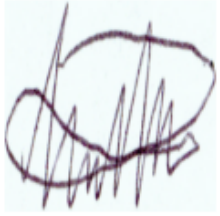
Predicted label:19Fake



Predicted label:20Real

Predicted label:21Real

Predicted label:22Fake



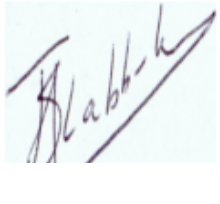
Predicted label:23Fake

Predicted label:24Fake

Predicted label:25Real

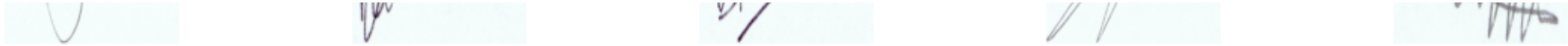
Predicted label:26Fake

Predicted label:27Fake



Predicted label:28Real

Predicted label:29Real



In [ ]: