In [8]:

```
# Não exibir warnings
import os
import sys
sys.stderr = open(os.devnull, "w")  # silence stderr
sys.stderr = sys.__stderr__  # unsilence stderr
```

In [9]:

```
#https://github.com/PacktPublishing/Neural-Network-Projects-with-Python/blob/master/Chapter04/main_vgg16.py

from keras.applications.vgg16 import VGG16
from keras.models import Model

from keras.models import Sequential
from keras.layers import Conv2D
from keras.layers import MaxPooling2D
from keras.layers import Flatten
from keras.layers import Dense
import matplotlib.pyplot as plt
from sklearn.metrics import classification_report, confusion_matrix
import tensorflow as tf
import numpy as np
import pandas as pd
import seaborn as sns

from PIL import Image, ImageFile
ImageFile.LOAD_TRUNCATED_IMAGES = True
```

In [10]:

```
# load and evaluate a saved model
from numpy import loadtxt
from keras.models import load_model

# load model
model = load_model('modelo_classificador_B_VGG19.h5')
# summarize model.
model.summary()
```

```
Model: "model_1"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
input_1 (InputLayer)         (None, 128, 128, 3)       0
_________________________________________________________________
vgg19 (Model)                (None, 4, 4, 512)         20024384
_________________________________________________________________
flatten (Flatten)            (None, 8192)              0
_________________________________________________________________
dense_1 (Dense)              (None, 2)                 16386
=================================================================
Total params: 20,040,770
Trainable params: 16,386
Non-trainable params: 20,024,384
_________________________________________________________________
```

In [11]:

```
#Função de geração da matriz de confusão
def print_confusion_matrix(confusion_matrix, class_names, figsize = (10,7), fontsize=11
):
    df_cm = pd.DataFrame(
        confusion_matrix, index=class_names, columns=class_names,
    )
    fig = plt.figure(figsize=figsize)
    try:
        heatmap = sns.heatmap(df_cm, cmap="YlGnBu", annot=True, fmt="d")
    except ValueError:
        raise ValueError("Confusion matrix values must be integers.")
    heatmap.yaxis.set_ticklabels(heatmap.yaxis.get_ticklabels(), rotation=0, ha='right'
, fontsize=fontsize)
    heatmap.xaxis.set_ticklabels(heatmap.xaxis.get_ticklabels(), rotation=30, ha='righ
t', fontsize=fontsize)

    b, t = plt.ylim() # discover the values for bottom and top
    b += 0.5 # Add 0.5 to the bottom
    t -= 0.5 # Subtract 0.5 from the top
    plt.ylim(b, t) # update the ylim(bottom, top) values

    plt.ylabel('True label')
    plt.xlabel('Predicted label')
    #return fig
```

In [12]:

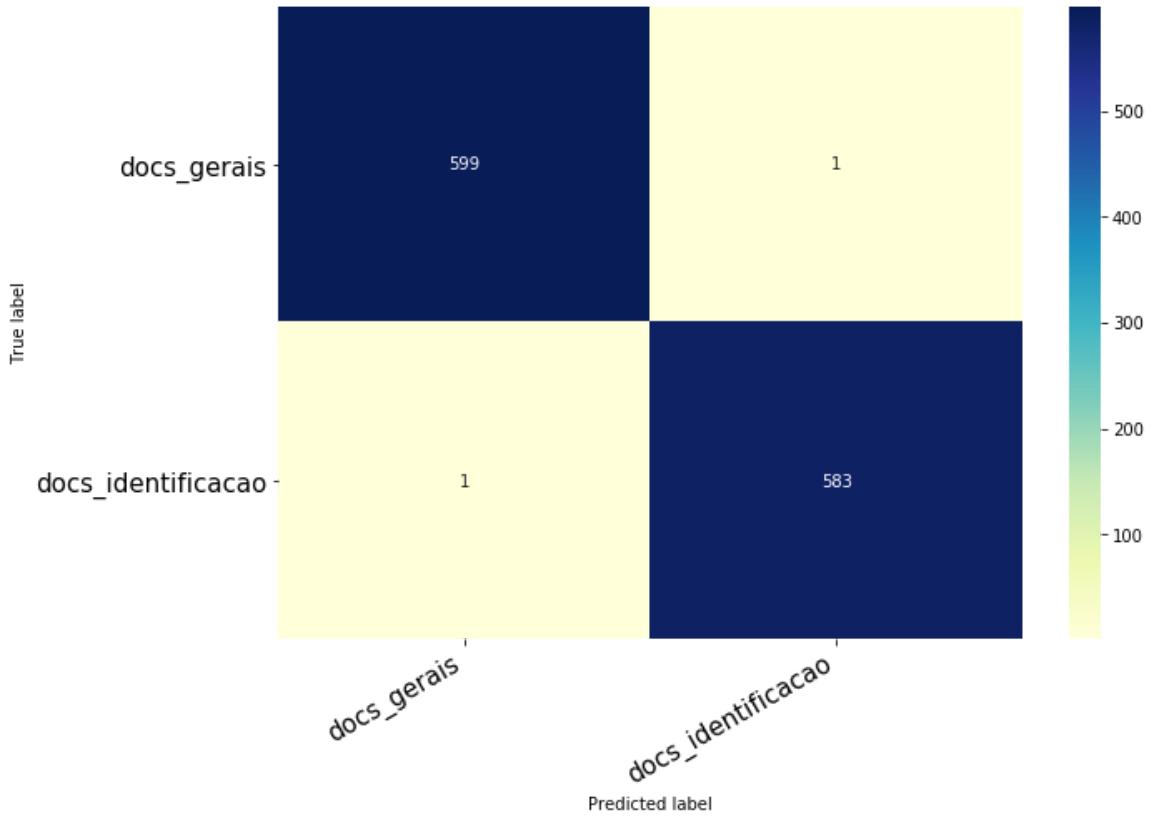
```
batch = 32


from keras.preprocessing.image import ImageDataGenerator

validation_datagen = ImageDataGenerator(rescale = 1./255)

validation_set = validation_datagen.flow_from_directory('classificador_B/validation/',
                                            target_size = (128, 128),
                                            color_mode="rgb",
                                            batch_size = batch, #alterado para 1
                                            class_mode = 'categorical',
                                            shuffle=True)
num_validation = validation_set.samples
```

```
Found 1200 images belonging to 2 classes.
```

In [13]:

```
### Conjunto de Validação ###

print ("### Matriz de confusão para o conjunto de validação ###")

#Conjunto de validação
validation_datagen = ImageDataGenerator(rescale = 1./255)

validation_set = validation_datagen.flow_from_directory('classificador_B/validation/',
                                                        target_size = (128, 128),
                                                        color_mode="rgb",
                                                        batch_size = batch, #alterado para 1
                                                        class_mode = 'categorical',
                                                        shuffle= False)


#Confution Matrix
Y_pred = model.predict_generator(validation_set, num_validation//batch, verbose=1)

test_preds = np.argmax(Y_pred, axis=-1)
l=test_preds.shape[0]
test_trues = validation_set.classes
cm =confusion_matrix(test_trues[:l], test_preds)

print_confusion_matrix(cm, ["docs_gerais", "docs_identificacao"], figsize = (10,7), fon
tsize=15)
```

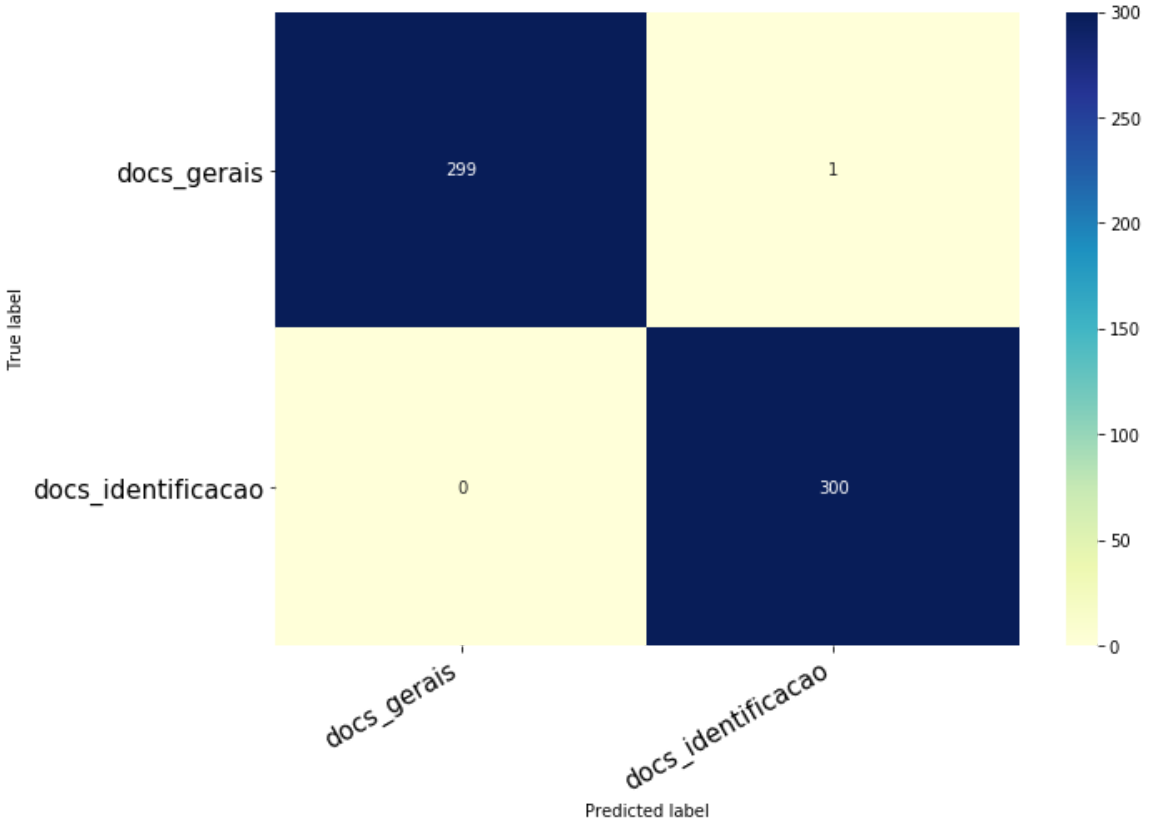
```
### Matriz de confusão para o conjunto de validação ###
Found 1200 images belonging to 2 classes.
37/37 [==============================] - 20s 534ms/step
```



In [14]:

```
### Conjunto de Teste ###

print ("### Matriz de confusão para o conjunto de teste ###")

test_datagen = ImageDataGenerator(rescale = 1./255)

test_set = test_datagen.flow_from_directory('classificador_B/test/',
                                            target_size = (128, 128),
                                            color_mode="rgb",
                                            batch_size = 1,
                                            class_mode = 'categorical',
                                            shuffle=False)
num_test = test_set.samples


#Confution Matrix
Y_pred = model.predict_generator(test_set, num_test, verbose=1)

test_preds = np.argmax(Y_pred, axis=-1)
l=test_preds.shape[0]
test_trues = test_set.classes
cm =confusion_matrix(test_trues[:l], test_preds)

print_confusion_matrix(cm, ["docs_gerais", "docs_identificacao"], figsize = (10,7), fon
tsize=15)

# Accuracy and Loss for the Test set
loss, acc = model.evaluate_generator(test_set, num_test, verbose=1)

# Final accuracy and loss
print ("Test accuracy: %.3f" % acc)
print ("Test loss: %.3f" % loss)
```

```
### Matriz de confusão para o conjunto de teste ###
Found 600 images belonging to 2 classes.
600/600 [==============================] - 12s 21ms/step
600/600 [==============================] - 13s 22ms/step
Test accuracy: 0.998
Test loss: 0.000
```




In [ ]: