Detector de Deepfake

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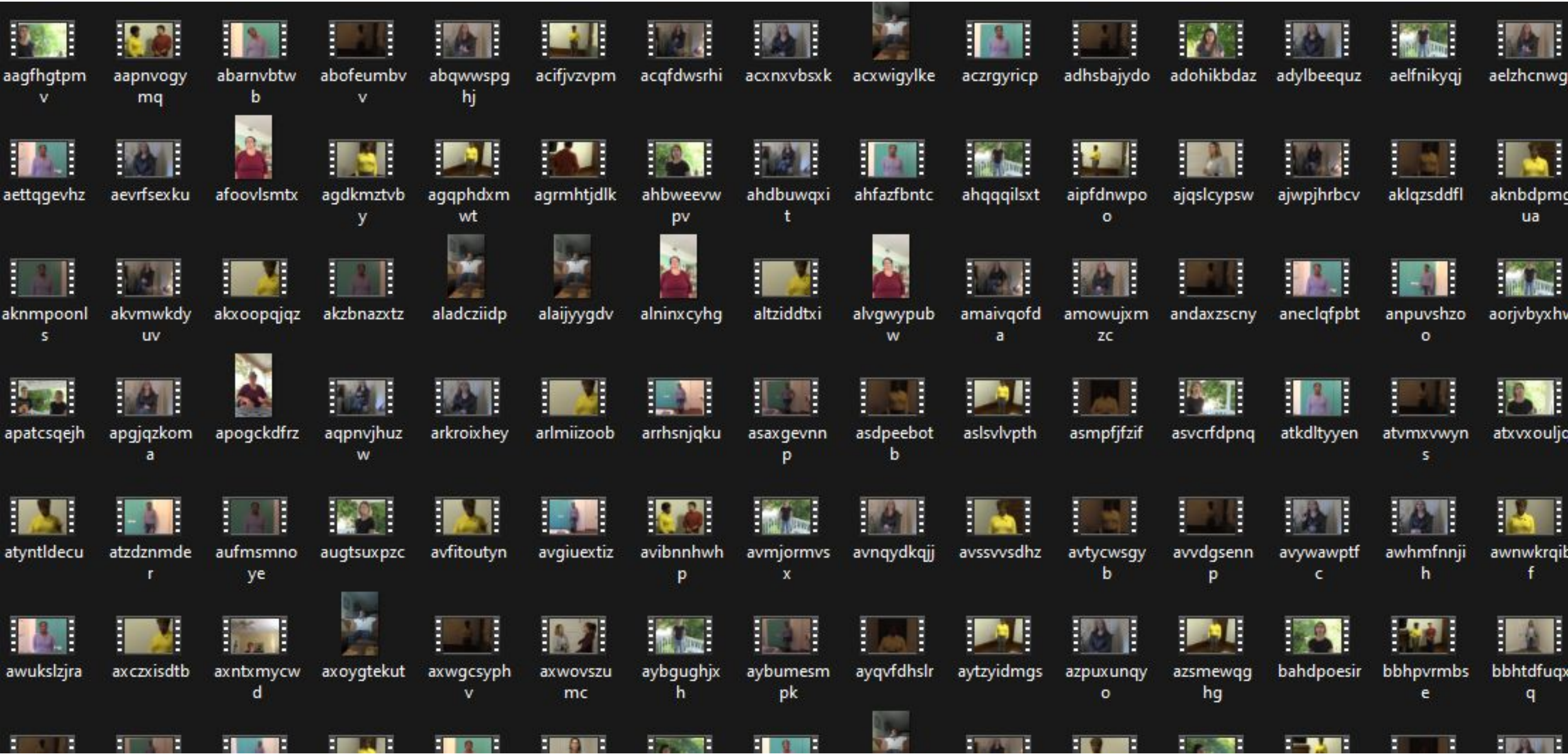
Dataset

Deepfake Detection Challenge
https://www.kaggle.com/competitions/deepfake-detection-challenge/data

The data is comprised of .mp4 files, split into compressed sets of ~10GB apiece. A metadata.json accompanies each set of .mp4 files, and contains filename, label (REAL/FAKE), original and split columns, listed below under **Columns**.

train_sample_videos (401 files)



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aettqgevhz aevrfsexku afoovlsmtx agdkmztvby agqphdxmwt agrmhtjdlk ahbweevwpv ahdbuwqxit ahfazfbntc ahqqqilsxt aipfdnwpoo ajqslcypsw ajwpjhrbcv aklqzsddfl aknbdpmgua

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apatcsqejh apgjqzkoma apogckdfrz aqpnvjhuzw arkroixhey arlmiizoob arrhsnjqku asaxgevnnp asdpeebotb aslsvlvpth asmpfjfzif asvcrfdpnq atkdltyyen atvmxvwyns atxvxoulj

atyntldecu atzdznmder aufmsmnoye augtsuxpzc avfitoutyn avgiuextiz avibnnhwhp avmjormvsx avnqydkqjj avssvvsdhz avtycwsgyb avvdgsennp avywawptfc awhmfnnjih awnwkrqibf

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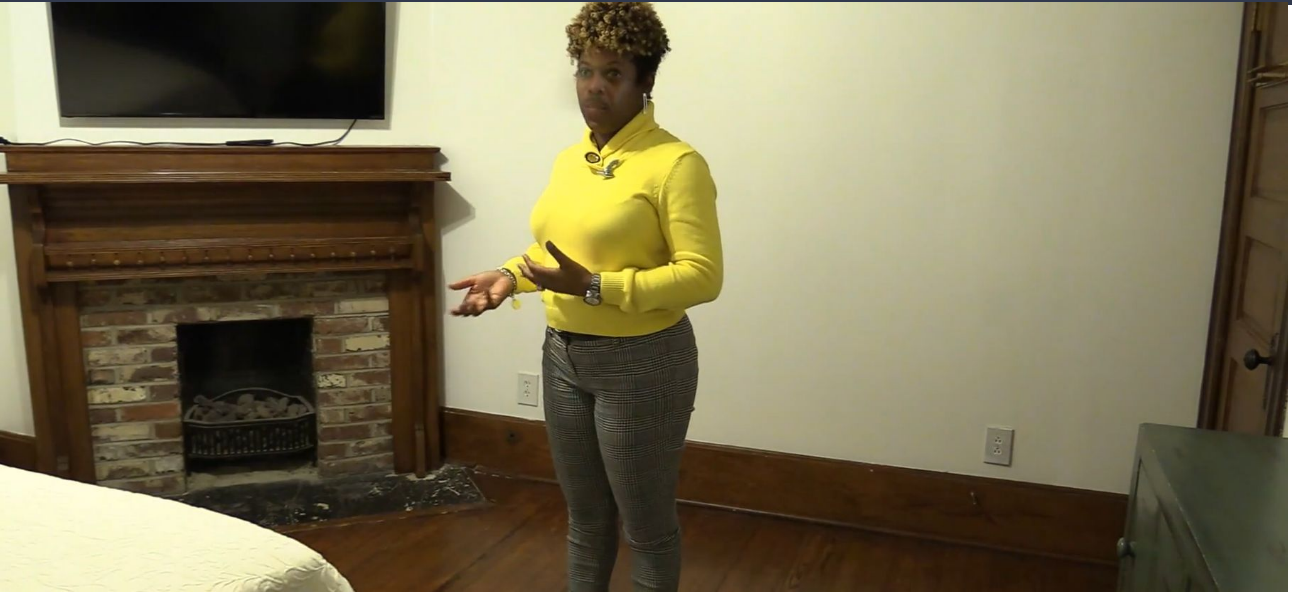
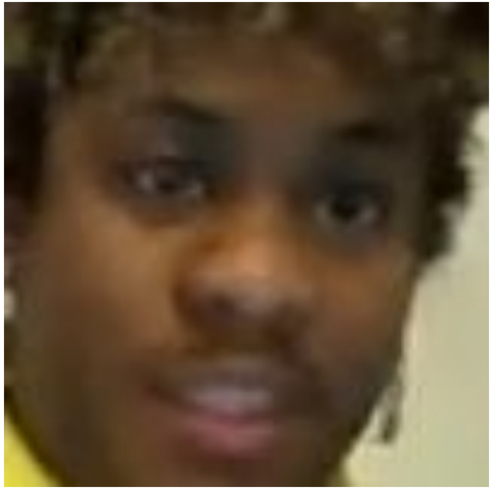
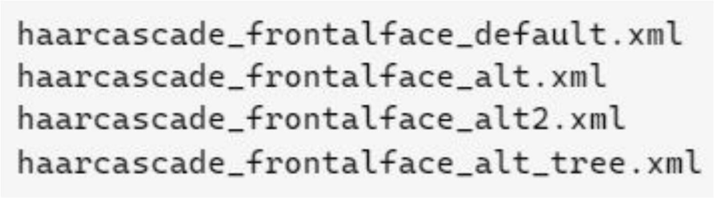
Detecção e recorte de faces





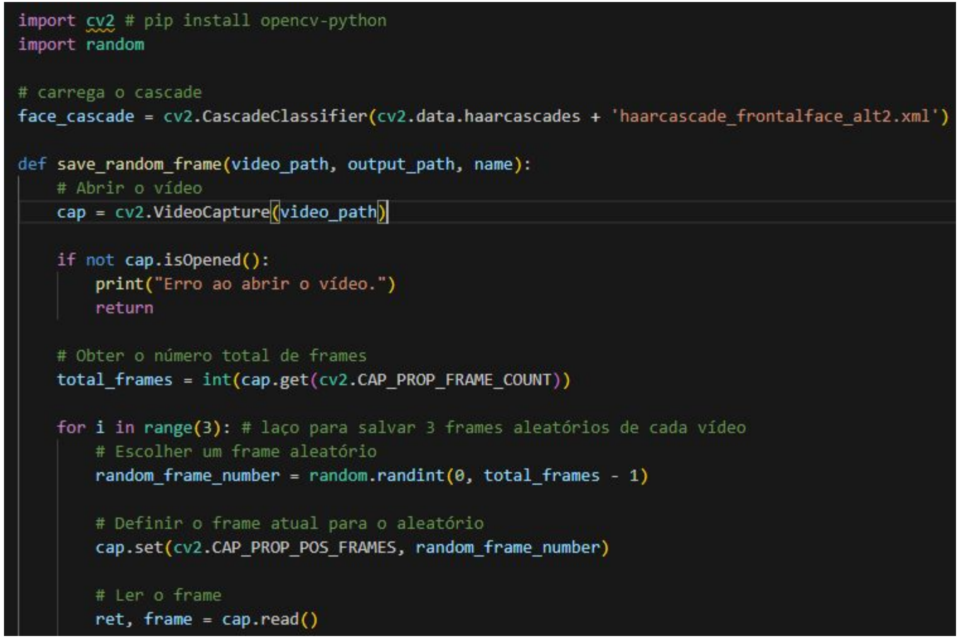
Detecção e recorte de faces



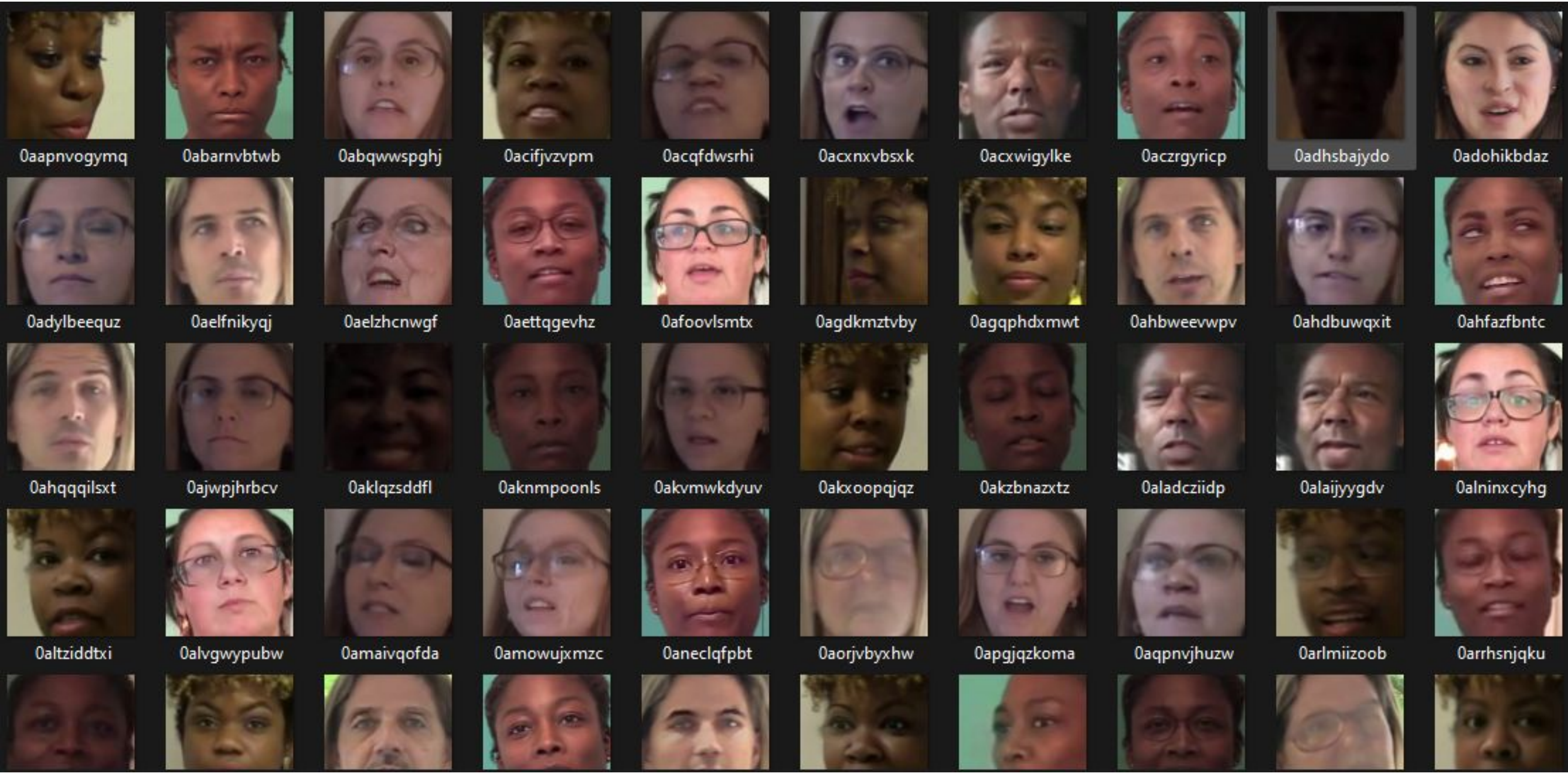
```
haarcascade_frontalface_default.xml
haarcascade_frontalface_alt.xml
haarcascade_frontalface_alt2.xml
haarcascade_frontalface_alt_tree.xml
```

import cv2 # pip install opencv-python

face_cascade = cv2.CascadeClassifier(cv2.data.haarcascades + 'haarcascade_frontalface_alt2.xml')



```python
import cv2 # pip install opencv-python
import random

# carrega o cascade
face_cascade = cv2.CascadeClassifier(cv2.data.haarcascades + 'haarcascade_frontalface_alt2.xml')

def save_random_frame(video_path, output_path, name):
    # Abrir o vídeo
    cap = cv2.VideoCapture(video_path)

    if not cap.isOpened():
        print("Erro ao abrir o vídeo.")
        return

    # Obter o número total de frames
    total_frames = int(cap.get(cv2.CAP_PROP_FRAME_COUNT))

    for i in range(3): # laço para salvar 3 frames aleatórios de cada vídeo
        # Escolher um frame aleatório
        random_frame_number = random.randint(0, total_frames - 1)

        # Definir o frame atual para o aleatório
        cap.set(cv2.CAP_PROP_POS_FRAMES, random_frame_number)

        # Ler o frame
        ret, frame = cap.read()
```


0aapnvogymq
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0acxnxvbsxk
0acxwigylke
0aczrgyricp
0adhsbajydo
0adohikbdaz
0adylbeequz
0aelfnikyqj
0aelzhcnwgf
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0afoovlsmtx
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0alaijyygdv
0alninxcyhg
0altziddtxi
0alvgwypubw
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0amowujxmzc
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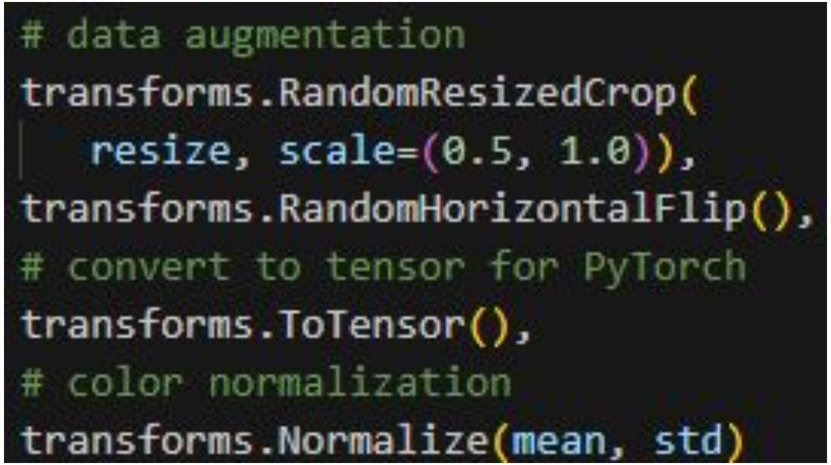
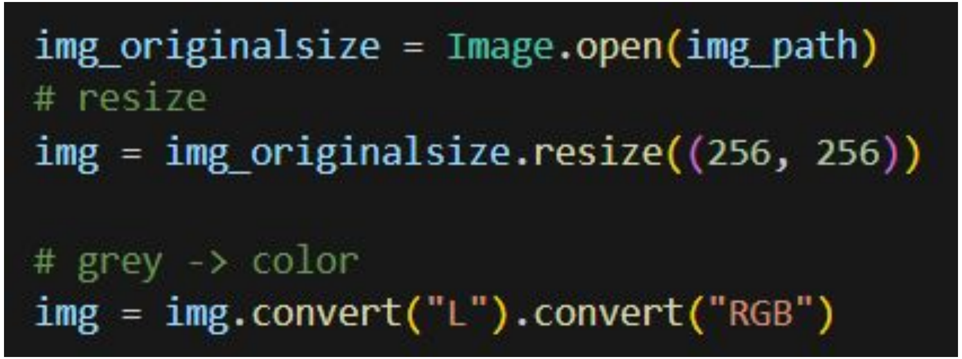
0arlmiizoob
0arrhsnjqku

Aumento de dados e Normalização

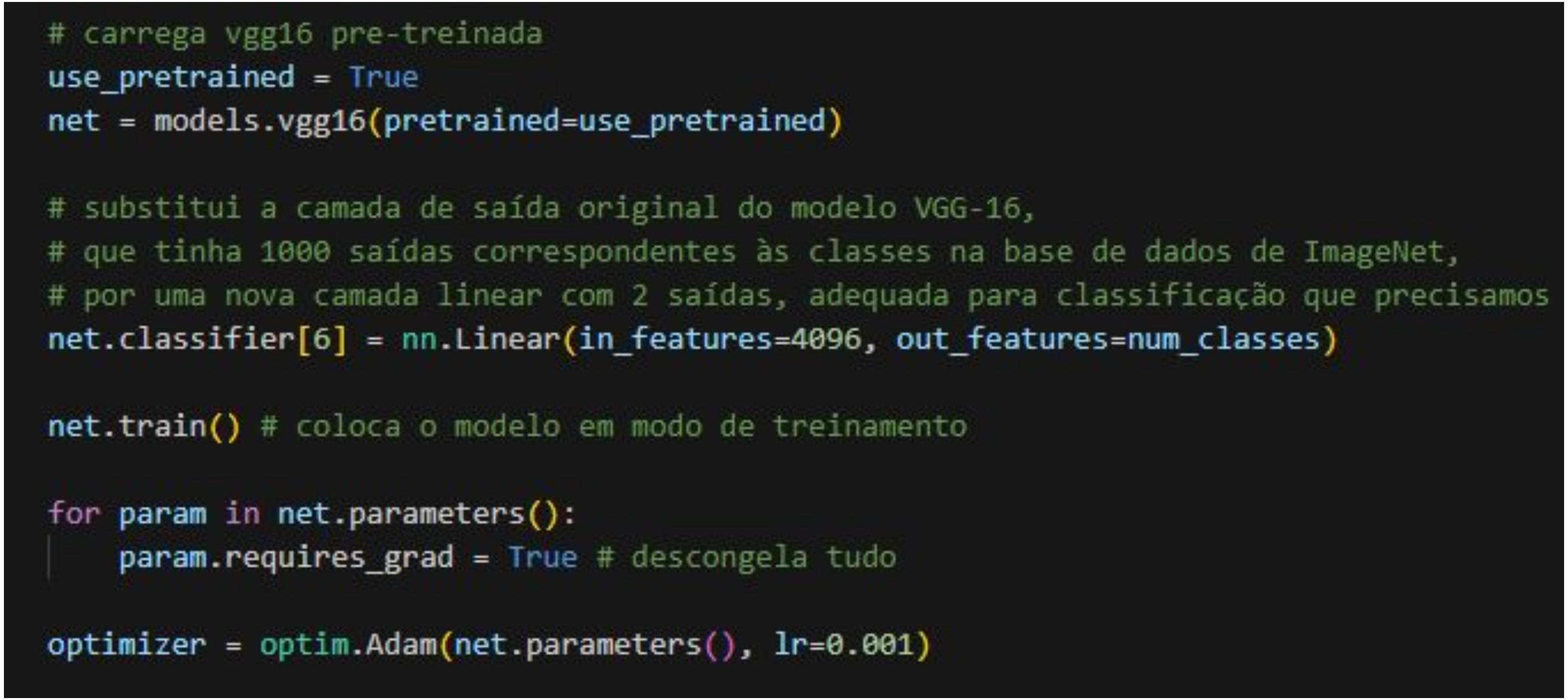


```
# data augmentation
transforms.RandomResizedCrop(
    resize, scale=(0.5, 1.0)),
transforms.RandomHorizontalFlip(),
# convert to tensor for PyTorch
transforms.ToTensor(),
# color normalization
transforms.Normalize(mean, std)
```



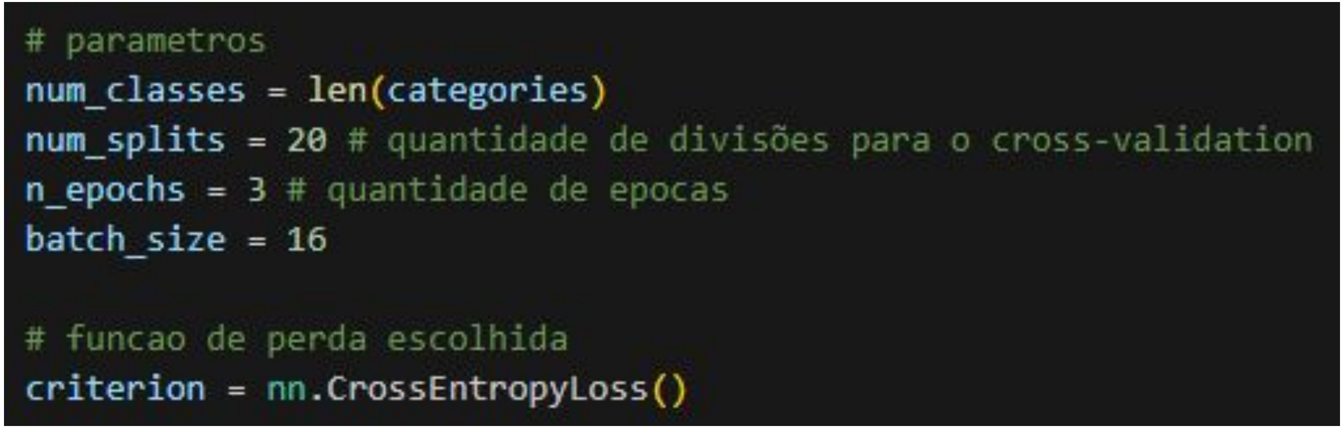
```
img_originalsize = Image.open(img_path)
# resize
img = img_originalsize.resize((256, 256))

# grey -> color
img = img.convert("L").convert("RGB")
```

Arquitetura VGG16



```
# carrega vgg16 pre-treinada
use_pretrained = True
net = models.vgg16(pretrained=use_pretrained)

# substitui a camada de saída original do modelo VGG-16,
# que tinha 1000 saídas correspondentes às classes na base de dados de ImageNet,
# por uma nova camada linear com 2 saídas, adequada para classificação que precisamos
net.classifier[6] = nn.Linear(in_features=4096, out_features=num_classes)

net.train() # coloca o modelo em modo de treinamento

for param in net.parameters():
    param.requires_grad = True # descongela tudo

optimizer = optim.Adam(net.parameters(), lr=0.001)
```

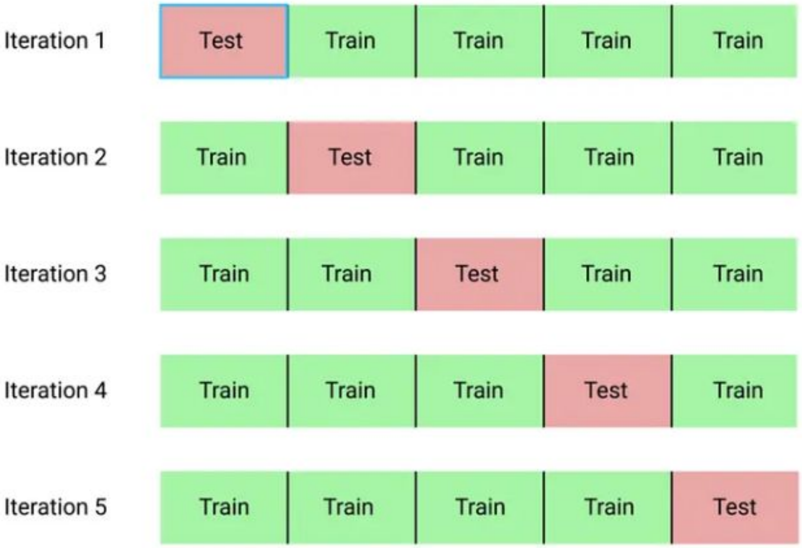
Parâmetros e função de perda



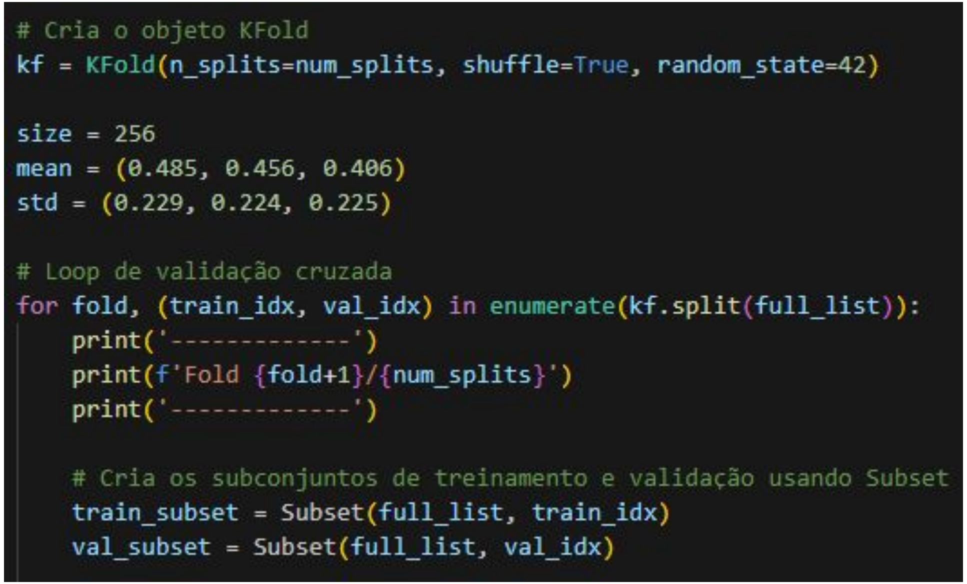
```
# parametros
num_classes = len(categories)
num_splits = 20 # quantidade de divisões para o cross-validation
n_epochs = 3 # quantidade de epocas
batch_size = 16

# funcao de perda escolhida
criterion = nn.CrossEntropyLoss()
```

K-folds

from sklearn.model_selection import KFold

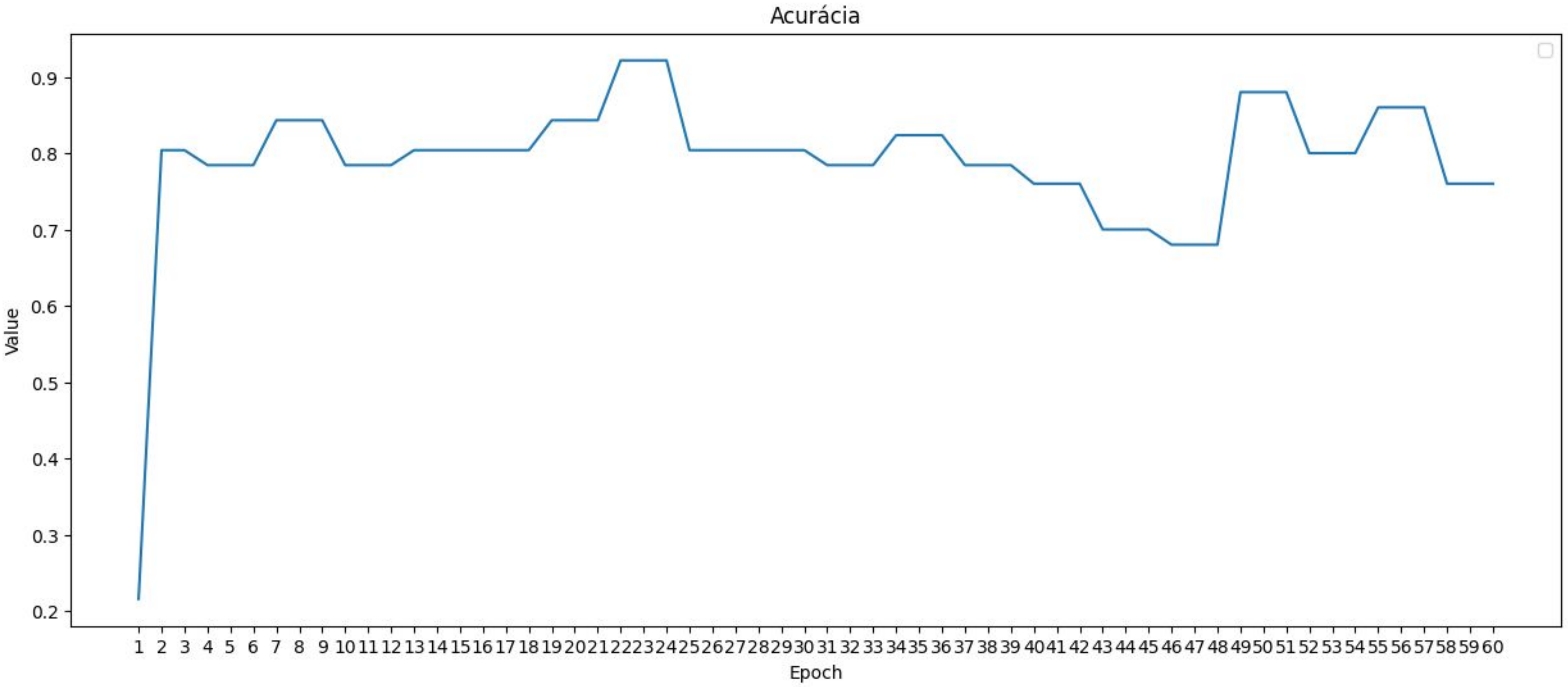


Iteration 1	Test	Train	Train	Train	Train
Iteration 2	Train	Test	Train	Train	Train
Iteration 3	Train	Train	Test	Train	Train
Iteration 4	Train	Train	Train	Test	Train
Iteration 5	Train	Train	Train	Train	Test

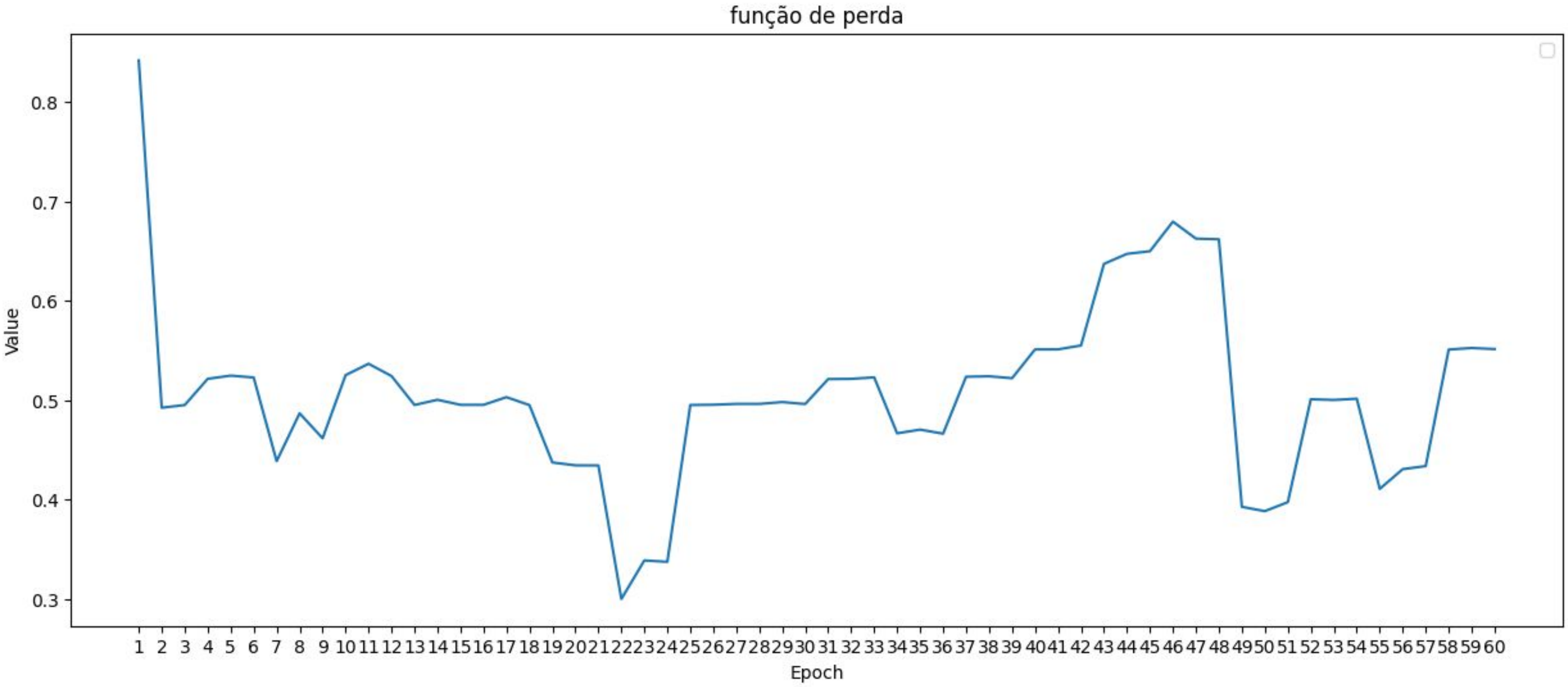


```python
# Cria o objeto KFold
kf = KFold(n_splits=num_splits, shuffle=True, random_state=42)

size = 256
mean = (0.485, 0.456, 0.406)
std = (0.229, 0.224, 0.225)

# Loop de validação cruzada
for fold, (train_idx, val_idx) in enumerate(kf.split(full_list)):
    print('-------------')
    print(f'Fold {fold+1}/{num_splits}')
    print('-------------')

    # Cria os subconjuntos de treinamento e validação usando Subset
    train_subset = Subset(full_list, train_idx)
    val_subset = Subset(full_list, val_idx)
```

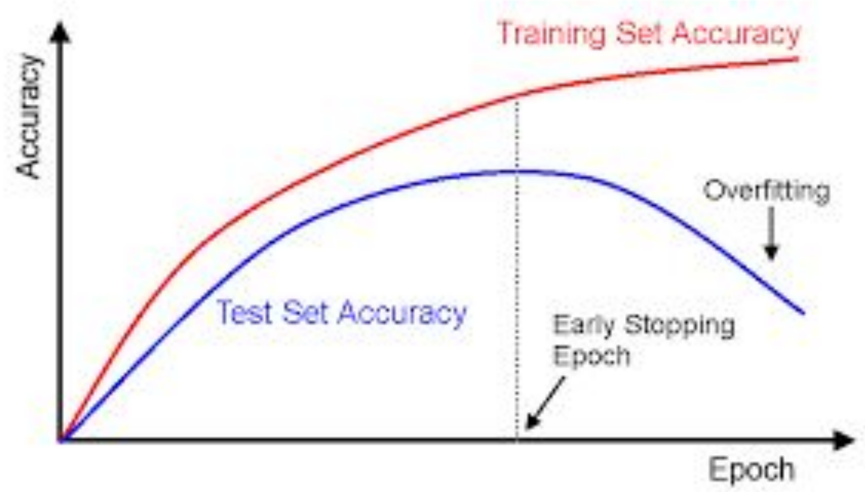
Acurácia

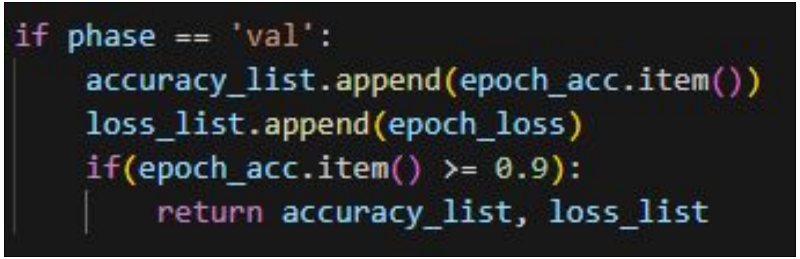

Acurácia
Value
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
Epoch
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60

Função de perda



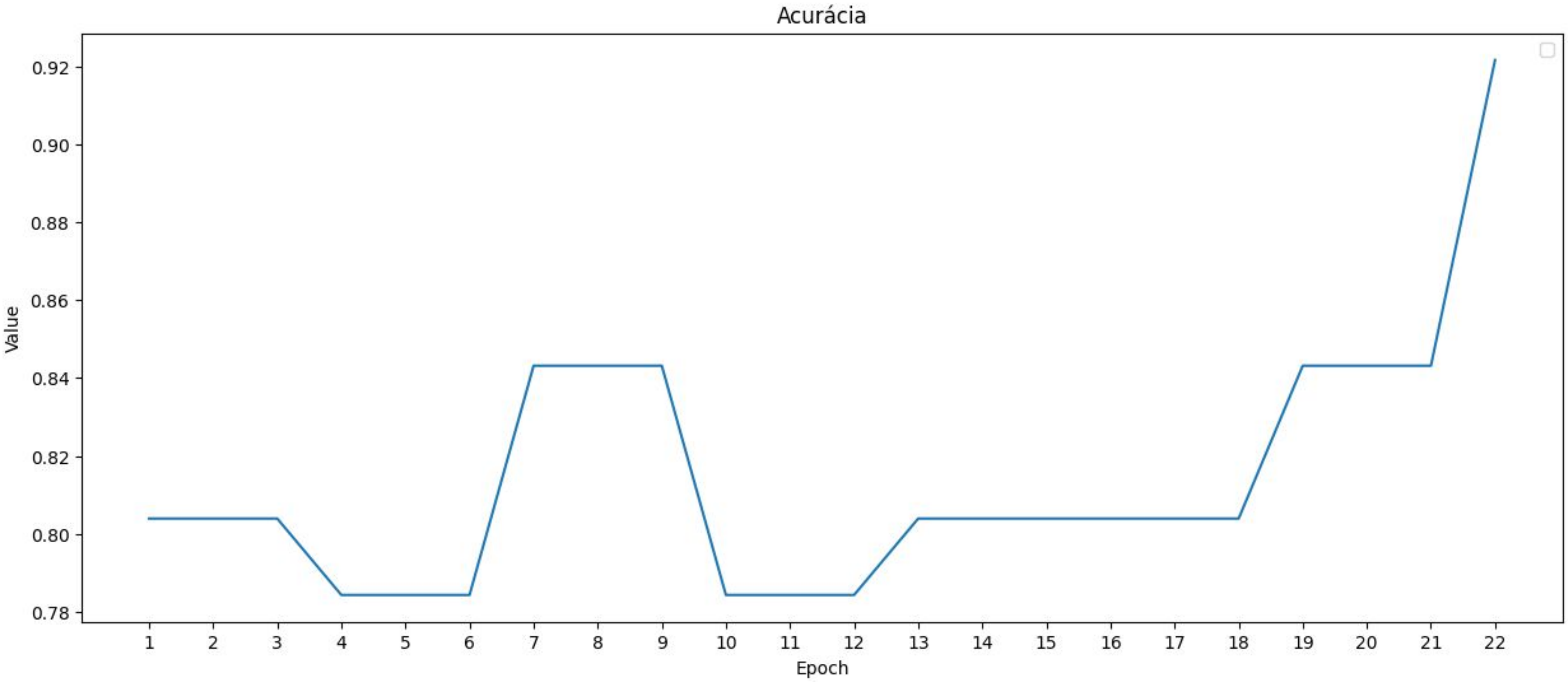
Early stopping



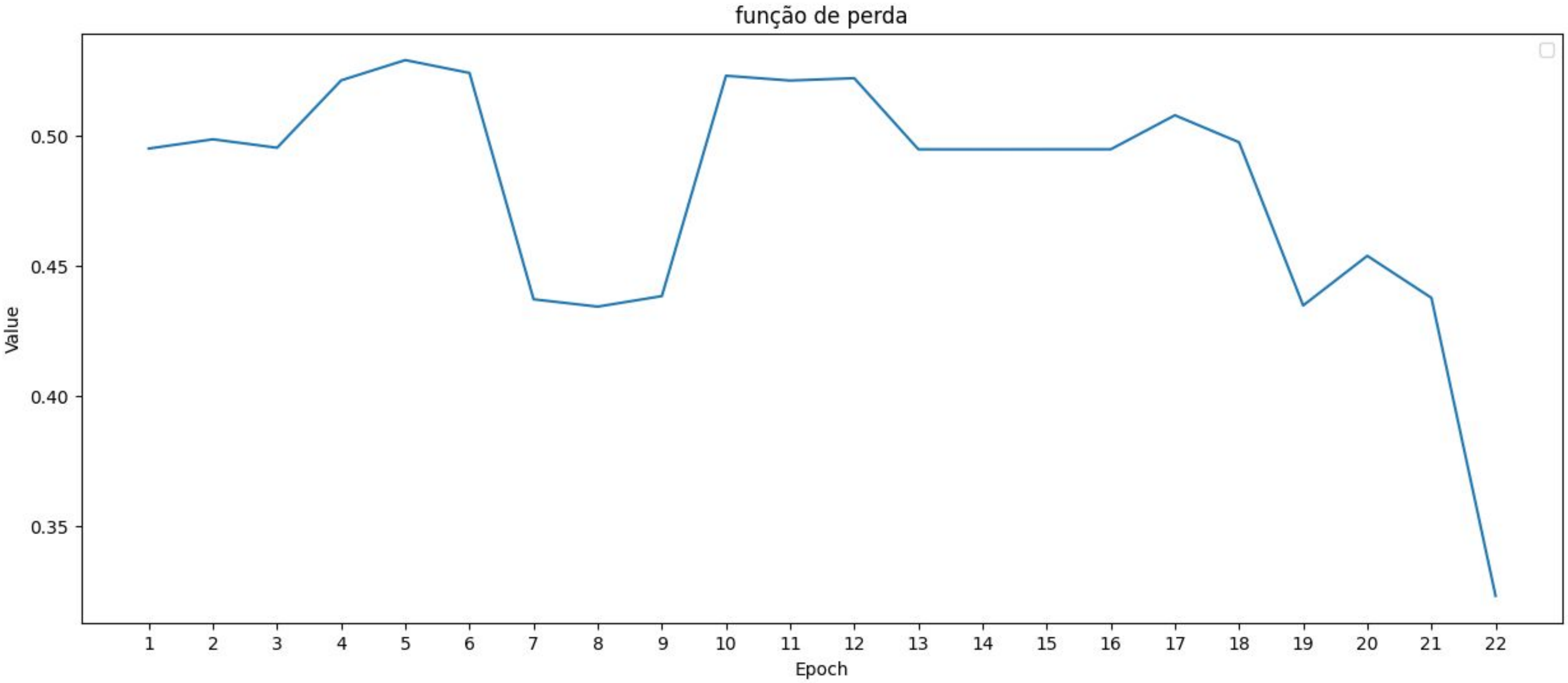


```python
if phase == 'val':
    accuracy_list.append(epoch_acc.item())
    loss_list.append(epoch_loss)
    if(epoch_acc.item() >= 0.9):
        return accuracy_list, loss_list
```

Acurácia


Acurácia
Value
0.92
0.90
0.88
0.86
0.84
0.82
0.80
0.78
Epoch
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22

Função de perda


função de perda
Value
Epoch