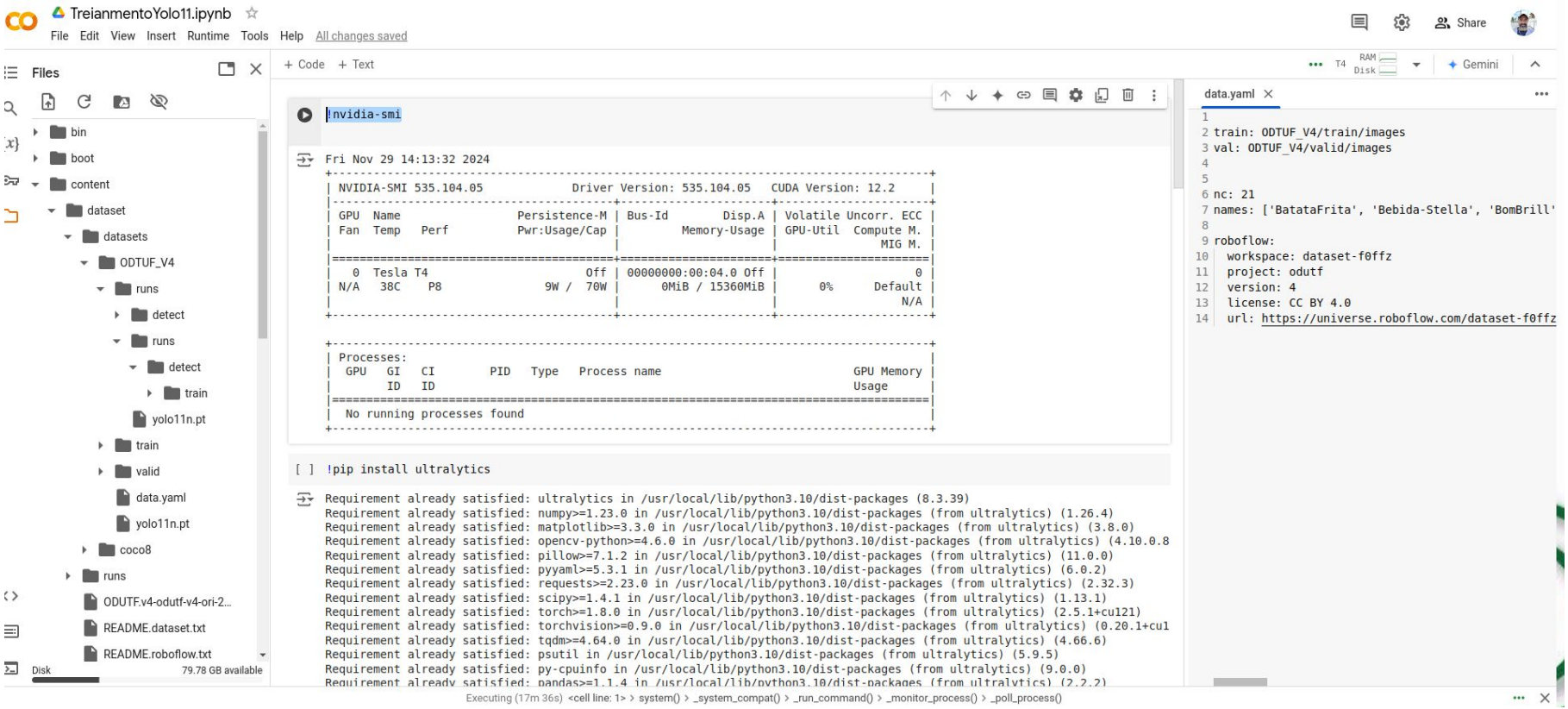
Visão Computacional
Aula - 14

Curso Ciência da Computação
Prof. Marlon

Usando o Yolo e Google Colab

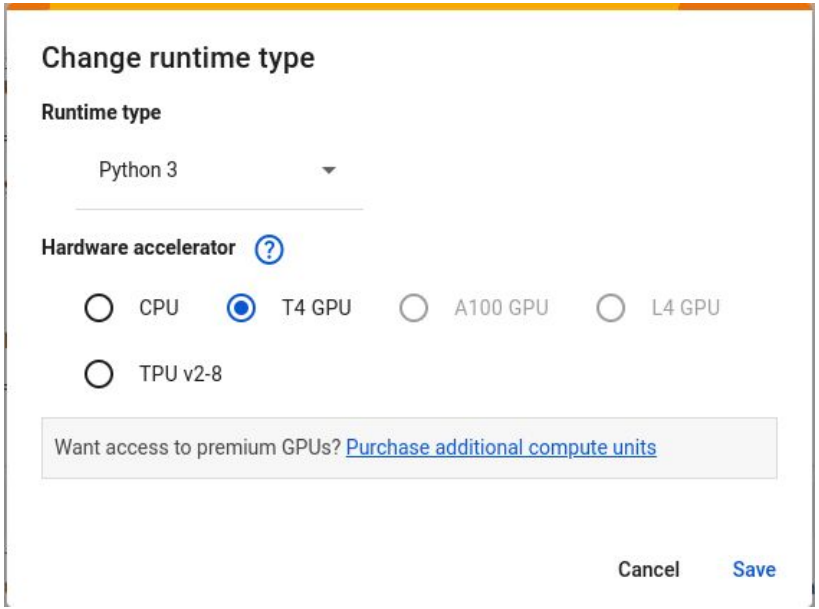

TreianmentoYolo11.ipynb
File Edit View Insert Runtime Tools Help All changes saved
Share
Files
bin
boot
content
dataset
datasets
ODTUF_V4
runs
detect
runs
detect
train
yolo11n.pt
train
valid
data.yaml
yolo11n.pt
coco8
runs
ODUTF.v4-odutf-v4-ori-2...
README.dataset.txt
README.roboflow.txt
Disk 79.78 GB available
+ Code + Text
T4 RAM Disk
Gemini
!nvidia-smi
Fri Nov 29 14:13:32 2024
| NVIDIA-SMI 535.104.05 Driver Version: 535.104.05 CUDA Version: 12.2 |
GPU Name Persistence-M	Bus-Id Disp.A	Volatile Uncorr. ECC
Fan Temp Perf Pwr:Usage/Cap	Memory-Usage	GPU-Util Compute M.	MIG M.
0 Tesla T4 Off	00000000:00:04.0 Off	0
N/A 38C P8 9W / 70W	0MiB / 15360MiB	0% Default	N/A
Processes:
GPU GI CI PID Type Process name GPU Memory
ID ID Usage
No running processes found
[ ] !pip install ultralytics
Requirement already satisfied: ultralytics in /usr/local/lib/python3.10/dist-packages (8.3.39)
Requirement already satisfied: numpy>=1.23.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (1.26.4)
Requirement already satisfied: matplotlib>=3.3.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (3.8.0)
Requirement already satisfied: opencv-python>=4.6.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (4.10.0.8
Requirement already satisfied: pillow>=7.1.2 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (11.0.0)
Requirement already satisfied: pyyaml>=5.3.1 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (6.0.2)
Requirement already satisfied: requests>=2.23.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (2.32.3)
Requirement already satisfied: scipy>=1.4.1 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (1.13.1)
Requirement already satisfied: torch>=1.8.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (2.5.1+cu121)
Requirement already satisfied: torchvision>=0.9.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (0.20.1+cu1
Requirement already satisfied: tqdm>=4.64.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (4.66.6)
Requirement already satisfied: psutil in /usr/local/lib/python3.10/dist-packages (from ultralytics) (5.9.5)
Requirement already satisfied: py-cpuinfo in /usr/local/lib/python3.10/dist-packages (from ultralytics) (9.0.0)
Requirement already satisfied: pandas>=1.1.4 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (2.2.2)
Executing (17m 36s) <cell line: 1> › system() › _system_compat() › _run_command() › _monitor_process() › _poll_process()
data.yaml
1
2 train: ODTUF_V4/train/images
3 val: ODTUF_V4/valid/images
4
5
6 nc: 21
7 names: ['BatataFrita', 'Bebida-Stella', 'BomBrill'
8
9 roboflow:
10 workspace: dataset-f0ffz
11 project: odutf
12 version: 4
13 license: CC BY 4.0
14 url: https://universe.roboflow.com/dataset-f0ffz

Passos

Verificar e configurar o uso de placa de vídeo ou unidade de processamento tensorial

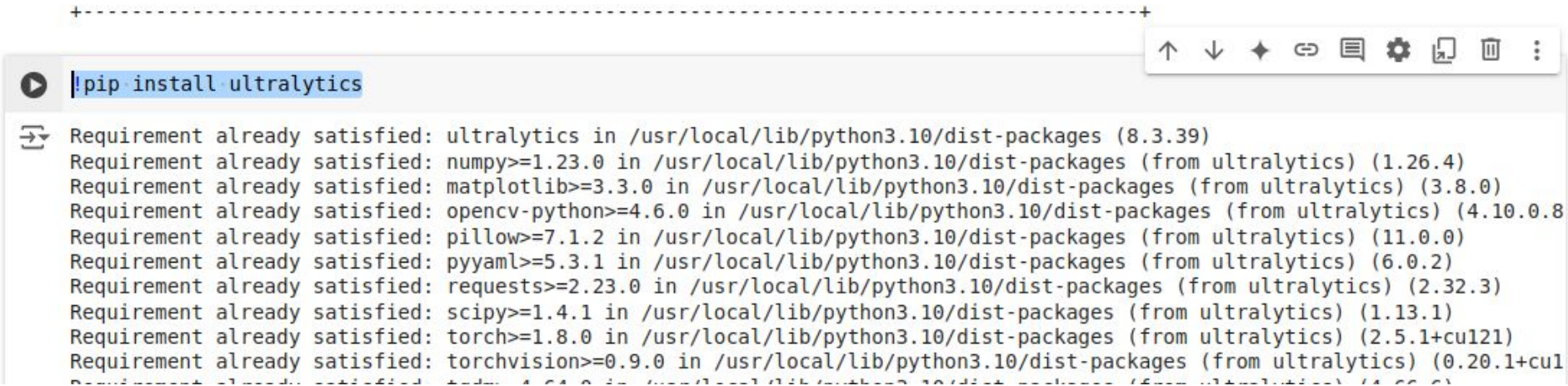
Comando para verificar a placa

!nvidia-smi



Instalando o Yolo

!pip install ultralytics



Carregando o dataset

Inserir o dataset com as imagens separadas duas pastas:

Train e Val

cada pasta contém subpastas

imagens

labels

Treinando a um rede neural

Primeiro, estar no lugar certo

Segundo

!yolo train data=data.yaml model=yolo11n.pt epochs=30 imgsz=640

data - contém a indicação das classes e das pastas

model - modelo pré-treinado

epochs - numero de vezes que o algoritmo será executado

imgsz - tamanho da imagem

```
Ultralytics 8.3.39 🚀 Python-3.10.12 torch-2.5.1+cu121 CUDA:0 (Tesla T4, 15102MiB)
engine/trainer: task=detect, mode=train, model=yolo11n.pt, data=data.yaml, epochs=30, time=None, patience=100, batch=16,
Overriding model.yaml nc=80 with nc=21

                   from  n    params  module                                       arguments
  0                  -1  1       464  ultralytics.nn.modules.conv.Conv             [3, 16, 3, 2]
  1                  -1  1      4672  ultralytics.nn.modules.conv.Conv             [16, 32, 3, 2]
  2                  -1  1      6640  ultralytics.nn.modules.block.C3k2            [32, 64, 1, False, 0.25]
  3                  -1  1     36992  ultralytics.nn.modules.conv.Conv             [64, 64, 3, 2]
  4                  -1  1     26080  ultralytics.nn.modules.block.C3k2            [64, 128, 1, False, 0.25]
  5                  -1  1    147712  ultralytics.nn.modules.conv.Conv             [128, 128, 3, 2]
  6                  -1  1     87040  ultralytics.nn.modules.block.C3k2            [128, 128, 1, True]
  7                  -1  1    295424  ultralytics.nn.modules.conv.Conv             [128, 256, 3, 2]
  8                  -1  1    346112  ultralytics.nn.modules.block.C3k2            [256, 256, 1, True]
  9                  -1  1    164608  ultralytics.nn.modules.block.SPPF            [256, 256, 5]
 10                  -1  1    249728  ultralytics.nn.modules.block.C2PSA           [256, 256, 1]
 11                  -1  1         0  torch.nn.modules.upsampling.Upsample         [None, 2, 'nearest']
 12             [-1, 6]  1         0  ultralytics.nn.modules.conv.Concat           [1]
 13                  -1  1    111296  ultralytics.nn.modules.block.C3k2            [384, 128, 1, False]
 14                  -1  1         0  torch.nn.modules.upsampling.Upsample         [None, 2, 'nearest']
 15             [-1, 4]  1         0  ultralytics.nn.modules.conv.Concat           [1]
 16                  -1  1     32096  ultralytics.nn.modules.block.C3k2            [256, 64, 1, False]
 17                  -1  1     36992  ultralytics.nn.modules.conv.Conv             [64, 64, 3, 2]
 18            [-1, 13]  1         0  ultralytics.nn.modules.conv.Concat           [1]
 19                  -1  1     86720  ultralytics.nn.modules.block.C3k2            [192, 128, 1, False]
 20                  -1  1    147712  ultralytics.nn.modules.conv.Conv             [128, 128, 3, 2]
 21            [-1, 10]  1         0  ultralytics.nn.modules.conv.Concat           [1]
 22                  -1  1    378880  ultralytics.nn.modules.block.C3k2            [384, 256, 1, True]
 23        [16, 19, 22]  1    434767  ultralytics.nn.modules.head.Detect           [21, [64, 128, 256]]
YOLO11n summary: 319 layers, 2,593,935 parameters, 2,593,919 gradients, 6.5 GFLOPs
```

gpu_mem - uso da memória da placa

box_loss - quanto o caixa está sobre o objeto

cls_loss - quanto a classe é equivalente ao objeto definido

dfl_loss - refinamento das previsões

mAP50 - métrica de detecção para objetos fáceis

mAP50-95 - desempenho em diferentes níveis de dificuldade

```
23/30      2.41G     0.7998     0.4735     0.9505         11        640: 100% 184/184 [00:52<00:00,  3.48it/s]
           Class     Images  Instances      Box(P          R      mAP50  mAP50-95): 100% 40/40 [00:07<00:00,  5.24i
             all       1260       1261      0.995      0.997      0.993      0.783

Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
24/30      2.41G     0.7905     0.4613     0.9525         11        640: 100% 184/184 [00:52<00:00,  3.50it/s]
           Class     Images  Instances      Box(P          R      mAP50  mAP50-95): 100% 40/40 [00:09<00:00,  4.14i
             all       1260       1261      0.995      0.997      0.993      0.788

Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
25/30      2.41G     0.7908     0.4523     0.9537         11        640: 100% 184/184 [00:52<00:00,  3.51it/s]
           Class     Images  Instances      Box(P          R      mAP50  mAP50-95): 100% 40/40 [00:09<00:00,  4.39i
             all       1260       1261      0.995      0.997      0.993      0.789

Epoch    GPU_mem   box_loss   cls_loss   dfl_loss  Instances       Size
26/30      2.41G     0.7812     0.4439     0.9544         16        640:  55% 102/184 [00:26<00:18,  4.35it/s]
```

```
30 epochs completed in 0.538 hours.
Optimizer stripped from runs/detect/train/weights/last.pt, 5.5MB
Optimizer stripped from runs/detect/train/weights/best.pt, 5.5MB

Validating runs/detect/train/weights/best.pt...
Ultralytics 8.3.39 🚀 Python-3.10.12 torch-2.5.1+cu121 CUDA:0 (Tesla T4, 15102MiB)
YOLO11n summary (fused): 238 layers, 2,586,247 parameters, 0 gradients, 6.3 GFLOPs
                 Class     Images  Instances      Box(P          R      mAP50  mAP50-95): 100% 40/40 [00:10<00:00,  3.
                   all       1260       1261      0.996      0.997      0.993      0.796
           BatataFrita         56         56      0.997          1      0.995      0.855
         Bebida-Stella         59         60      0.997      0.983       0.99      0.798
              BomBrill         68         68      0.998      0.985      0.989      0.803
            CBSLaranja         54         54      0.997          1      0.995      0.857
             Cafe500g          58         58      0.997          1      0.995      0.883
        ChocolateAvela         51         51      0.997          1      0.995      0.867
               CloseUp         76         76      0.999          1      0.995      0.707
               Colgate         61         61      0.998          1      0.995      0.756
          CopoPlastico         56         56      0.998          1      0.995      0.785
                 DTone         50         51      0.997       0.98      0.987      0.789
              Fermento         64         64      0.999          1      0.995      0.651
            LeiteCoco          55         55      0.998          1      0.995      0.775
       LeiteCondensado         62         62      0.999          1      0.995      0.804
              Macarrao         63         63      0.984          1      0.993      0.778
         Macarrao Pote         50         50      0.997          1      0.995      0.835
            MilhoVerde         67         67      0.998          1      0.995      0.727
          MolhoTomate          57         57      0.998      0.982      0.992      0.845
           PingoDOuro          67         67      0.984          1      0.987      0.841
             Sabonete          73         73      0.999          1      0.995      0.633
              SucoUva          58         58       0.98          1       0.99      0.871
          ToalhadePapel        54         54      0.997          1      0.995      0.849
Speed: 0.2ms preprocess, 1.8ms inference, 0.0ms loss, 1.7ms postprocess per image
Results saved to runs/detect/train
```

Detecção

```
!yolo detect predict model=runs/detect/train/weights/best.pt source='../f7.jpeg'
```

```
Ultralytics 8.3.39 🚀 Python-3.10.12 torch-2.5.1+cu121 CUDA:0 (Tesla T4, 15102MiB)
YOLO11n summary (fused): 238 layers, 2,586,247 parameters, 0 gradients, 6.3 GFLOPs

image 1/1 /content/dataset/datasets/ODTUF_V4/../f7.jpeg: 384x640 1 LeiteCoco, 1 MolhoTomate, 1 SucoUva, 44.6ms
Speed: 2.4ms preprocess, 44.6ms inference, 571.6ms postprocess per image at shape (1, 3, 384, 640)
Results saved to runs/detect/predict
💡 Learn more at https://docs.ultralytics.com/modes/predict
```

Obrigado 😊