

```
%pip install ultralytics
```

```

↳ Downloading nvidia_cuda_runtime_cu12-12.4.127-py3-none-manylinux2014_x86_64.whl (883 kB)
   883.7/883.7 kB 40.9 MB/s eta 0:00:00
Downloading nvidia_cudnn_cu12-9.1.0.70-py3-none-manylinux2014_x86_64.whl (664.8 MB)
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Downloading nvidia_cufft_cu12-11.2.1.3-py3-none-manylinux2014_x86_64.whl (211.5 MB)
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Downloading nvidia_curand_cu12-10.3.5.147-py3-none-manylinux2014_x86_64.whl (56.3 MB)
   56.3/56.3 MB 13.3 MB/s eta 0:00:00
Downloading nvidia_cusolver_cu12-11.6.1.9-py3-none-manylinux2014_x86_64.whl (127.9 MB)
   127.9/127.9 MB 7.4 MB/s eta 0:00:00
Downloading nvidia_cusparses_cu12-12.3.1.170-py3-none-manylinux2014_x86_64.whl (207.5 MB)
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Downloading nvidia_nvjitlink_cu12-12.4.127-py3-none-manylinux2014_x86_64.whl (21.1 MB)
   21.1/21.1 MB 100.5 MB/s eta 0:00:00
Downloading ultralytics_thop-2.0.14-py3-none-any.whl (26 kB)
Installing collected packages: nvidia-nvjitlink-cu12, nvidia-curand-cu12, nvidia-cufft-cu12, nvidia-cu
Attempting uninstall: nvidia-nvjitlink-cu12
  Found existing installation: nvidia-nvjitlink-cu12 12.5.82
  Uninstalling nvidia-nvjitlink-cu12-12.5.82:
    Successfully uninstalled nvidia-nvjitlink-cu12-12.5.82
Attempting uninstall: nvidia-curand-cu12
  Found existing installation: nvidia-curand-cu12 10.3.6.82
  Uninstalling nvidia-curand-cu12-10.3.6.82:
    Successfully uninstalled nvidia-curand-cu12-10.3.6.82
Attempting uninstall: nvidia-cufft-cu12
  Found existing installation: nvidia-cufft-cu12 11.2.3.61
  Uninstalling nvidia-cufft-cu12-11.2.3.61:
    Successfully uninstalled nvidia-cufft-cu12-11.2.3.61
Attempting uninstall: nvidia-cuda-runtime-cu12
  Found existing installation: nvidia-cuda-runtime-cu12 12.5.82
  Uninstalling nvidia-cuda-runtime-cu12-12.5.82:
    Successfully uninstalled nvidia-cuda-runtime-cu12-12.5.82
Attempting uninstall: nvidia-cuda-nvrtc-cu12
  Found existing installation: nvidia-cuda-nvrtc-cu12 12.5.82
  Uninstalling nvidia-cuda-nvrtc-cu12-12.5.82:
    Successfully uninstalled nvidia-cuda-nvrtc-cu12-12.5.82
Attempting uninstall: nvidia-cuda-cupti-cu12
  Found existing installation: nvidia-cuda-cupti-cu12 12.5.82
  Uninstalling nvidia-cuda-cupti-cu12-12.5.82:
    Successfully uninstalled nvidia-cuda-cupti-cu12-12.5.82
Attempting uninstall: nvidia-cublas-cu12
  Found existing installation: nvidia-cublas-cu12 12.5.3.2
  Uninstalling nvidia-cublas-cu12-12.5.3.2:
    Successfully uninstalled nvidia-cublas-cu12-12.5.3.2
Attempting uninstall: nvidia-cusparses-cu12
  Found existing installation: nvidia-cusparses-cu12 12.5.1.3
  Uninstalling nvidia-cusparses-cu12-12.5.1.3:
    Successfully uninstalled nvidia-cusparses-cu12-12.5.1.3
Attempting uninstall: nvidia-cudnn-cu12
  Found existing installation: nvidia-cudnn-cu12 9.3.0.75
  Uninstalling nvidia-cudnn-cu12-9.3.0.75:
    Successfully uninstalled nvidia-cudnn-cu12-9.3.0.75
Attempting uninstall: nvidia-cusolver-cu12
  Found existing installation: nvidia-cusolver-cu12 11.6.3.83
  Uninstalling nvidia-cusolver-cu12-11.6.3.83:
    Successfully uninstalled nvidia-cusolver-cu12-11.6.3.83
Successfully installed nvidia-cublas-cu12-12.4.5.8 nvidia-cuda-cupti-cu12-12.4.127 nvidia-cuda-nvrtc-cu

```

```
from google.colab import drive
```

```

# Montar Google Drive
print("Montando Google Drive...")
drive.mount('/content/drive')
print("Google Drive montado.")

```



Montando Google Drive...

Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive")

Google Drive montado.

Instalar/Actualizar Ultralytics

print("\nInstalando/Actualizando Ultralytics a la última versión para soporte YOLOv11...")

%pip install -U ultralytics

print("Ultralytics instalado/actualizado.")



Instalando/Actualizando Ultralytics a la última versión para soporte YOLOv11...

Requirement already satisfied: ultralytics in /usr/local/lib/python3.11/dist-packages (8.3.163)

Requirement already satisfied: numpy>=1.23.0 in /usr/local/lib/python3.11/dist-packages (from ultralytics)

Requirement already satisfied: matplotlib>=3.3.0 in /usr/local/lib/python3.11/dist-packages (from ultralytics)

Requirement already satisfied: opencv-python>=4.6.0 in /usr/local/lib/python3.11/dist-packages (from ultralytics)

Requirement already satisfied: pillow>=7.1.2 in /usr/local/lib/python3.11/dist-packages (from ultralytics)

Requirement already satisfied: pyyaml>=5.3.1 in /usr/local/lib/python3.11/dist-packages (from ultralytics)

Requirement already satisfied: requests>=2.23.0 in /usr/local/lib/python3.11/dist-packages (from ultralytics)

Requirement already satisfied: scipy>=1.4.1 in /usr/local/lib/python3.11/dist-packages (from ultralytics)

Requirement already satisfied: torch>=1.8.0 in /usr/local/lib/python3.11/dist-packages (from ultralytics)

Requirement already satisfied: torchvision>=0.9.0 in /usr/local/lib/python3.11/dist-packages (from ultralytics)

Requirement already satisfied: tqdm>=4.64.0 in /usr/local/lib/python3.11/dist-packages (from ultralytics)

Requirement already satisfied: psutil in /usr/local/lib/python3.11/dist-packages (from ultralytics) (5.9)

Requirement already satisfied: py-cpuinfo in /usr/local/lib/python3.11/dist-packages (from ultralytics)

Requirement already satisfied: pandas>=1.1.4 in /usr/local/lib/python3.11/dist-packages (from ultralytics)

Requirement already satisfied: ultralytics-thop>=2.0.0 in /usr/local/lib/python3.11/dist-packages (from ultralytics)

Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.11/dist-packages (from matplotlib)

Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.11/dist-packages (from matplotlib)

Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.11/dist-packages (from matplotlib)

Requirement already satisfied: kiwisolver>=1.3.1 in /usr/local/lib/python3.11/dist-packages (from matplotlib)

Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.11/dist-packages (from matplotlib)

Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.11/dist-packages (from matplotlib)

Requirement already satisfied: python-dateutil>=2.7 in /usr/local/lib/python3.11/dist-packages (from matplotlib)

Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.11/dist-packages (from pandas>=1.1)

Requirement already satisfied: tzdata>=2022.7 in /usr/local/lib/python3.11/dist-packages (from pandas>=1.1)

Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.11/dist-packages (from requests>=2)

Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.11/dist-packages (from requests>=2)

Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.11/dist-packages (from requests>=2)

Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.11/dist-packages (from requests>=2)

Requirement already satisfied: filelock in /usr/local/lib/python3.11/dist-packages (from torch>=1.8.0->ultralytics)

Requirement already satisfied: typing-extensions>=4.10.0 in /usr/local/lib/python3.11/dist-packages (from torch>=1.8.0->ultralytics)

Requirement already satisfied: networkx in /usr/local/lib/python3.11/dist-packages (from torch>=1.8.0->ultralytics)

Requirement already satisfied: jinja2 in /usr/local/lib/python3.11/dist-packages (from torch>=1.8.0->ultralytics)

Requirement already satisfied: fsspec in /usr/local/lib/python3.11/dist-packages (from torch>=1.8.0->ultralytics)

Requirement already satisfied: nvidia-cuda-nvrtc-cu12==12.4.127 in /usr/local/lib/python3.11/dist-packages (from torch>=1.8.0->ultralytics)

Requirement already satisfied: nvidia-cuda-runtime-cu12==12.4.127 in /usr/local/lib/python3.11/dist-packages (from torch>=1.8.0->ultralytics)

Requirement already satisfied: nvidia-cuda-cupti-cu12==12.4.127 in /usr/local/lib/python3.11/dist-packages (from torch>=1.8.0->ultralytics)

Requirement already satisfied: nvidia-cudnn-cu12==9.1.0.70 in /usr/local/lib/python3.11/dist-packages (from torch>=1.8.0->ultralytics)

Requirement already satisfied: nvidia-cublas-cu12==12.4.5.8 in /usr/local/lib/python3.11/dist-packages (from torch>=1.8.0->ultralytics)

Requirement already satisfied: nvidia-cufft-cu12==11.2.1.3 in /usr/local/lib/python3.11/dist-packages (from torch>=1.8.0->ultralytics)

Requirement already satisfied: nvidia-curand-cu12==10.3.5.147 in /usr/local/lib/python3.11/dist-packages (from torch>=1.8.0->ultralytics)

Requirement already satisfied: nvidia-cusolver-cu12==11.6.1.9 in /usr/local/lib/python3.11/dist-packages (from torch>=1.8.0->ultralytics)

Requirement already satisfied: nvidia-cusparselt-cu12==0.6.2 in /usr/local/lib/python3.11/dist-packages (from torch>=1.8.0->ultralytics)

Requirement already satisfied: nvidia-nccl-cu12==2.21.5 in /usr/local/lib/python3.11/dist-packages (from torch>=1.8.0->ultralytics)

Requirement already satisfied: nvidia-nvtx-cu12==12.4.127 in /usr/local/lib/python3.11/dist-packages (from torch>=1.8.0->ultralytics)

Requirement already satisfied: nvidia-nvjitlink-cu12==12.4.127 in /usr/local/lib/python3.11/dist-packages (from torch>=1.8.0->ultralytics)

Requirement already satisfied: triton==3.2.0 in /usr/local/lib/python3.11/dist-packages (from torch>=1.8.0->ultralytics)

Requirement already satisfied: sympy==1.13.1 in /usr/local/lib/python3.11/dist-packages (from torch>=1.8.0->ultralytics)

Requirement already satisfied: mpmath<1.4,>=1.1.0 in /usr/local/lib/python3.11/dist-packages (from sympy)

Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.11/dist-packages (from python-dateutil)

Requirement already satisfied: MarkupSafe>=2.0 in /usr/local/lib/python3.11/dist-packages (from jinja2->ultralytics)

Ultralytics instalado/actualizado.

from google.colab import drive

import os

import torch

```

import sys
import time
from ultralytics import YOLO

# Verificar disponibilidad de GPU
print("\nVerificando disponibilidad de GPU...")
device_to_use = "0" if torch.cuda.is_available() else "cpu"
print(f"Usando dispositivo: {device_to_use}")

# Definir rutas del dataset y modelo
data_yaml_path = "/content/drive/MyDrive/Colab Notebooks/LSECNuYoloII/dataset/data - colab.yaml"
project_directory = "/content/drive/MyDrive/Colab Notebooks/LSECNuYoloII/runs"
run_name = "yolo10_adam_lr005"

# Lista de modelos a intentar en orden de preferencia
initial_model_preferences = ['yolov11s.pt', 'yolov10s.pt']
checkpoint_path = os.path.join(project_directory, "detect", run_name, "weights", "last.pt")

# Cargar modelo con lógica de prioridades
print(f"\nBuscando modelo entre: {initial_model_preferences}")
model = None

if os.path.exists(checkpoint_path):
    print(f"Cargando desde checkpoint: {checkpoint_path}")
    try:
        model = YOLO(checkpoint_path)
    except Exception as e:
        print(f"Error al cargar checkpoint: {e}")

if model is None:
    for preferred_model in initial_model_preferences:
        try:
            model = YOLO(preferred_model)
            print(f"Modelo {preferred_model} cargado exitosamente.")
            break
        except Exception as e:
            print(f"Error al cargar {preferred_model}: {e}")

if model is None:
    print("Error crítico: No se pudo cargar ningún modelo.")
    exit()

# Definir hiperparámetros
optimizer = "adam" #"adam" #"sgd"
lr0 = 0.005 #0.001
lrf = 0.1 #0.1
momentum = 0.937

# Imprimir el modelo que se va a usar
print(f"\nEl modelo que se usará para el entrenamiento es: {model}")

# Entrenar el modelo
print("\nIniciando entrenamiento del modelo...")
results = model.train(data=data_yaml_path, epochs=100, optimizer=optimizer, lr0=lr0, lrf=lrf, momentum=momentum)

print("\nEntrenamiento completado! Resultados guardados en:")
print(os.path.join(project_directory, "detect", run_name))

```



Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
96/100	3.16G	0.8963	0.7882	1.772	6	640: 100% ██████████ 46/46 [
	Class	Images	Instances	Box(P	R	mAP50 mAP50-95): 100% ██████████

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
97/100	3.16G	0.9022	0.7865	1.787	6	640: 100% ██████████ 46/46 [
	Class	Images	Instances	Box(P	R	mAP50 mAP50-95): 100% ██████████

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
98/100	3.16G	0.8962	0.7764	1.791	6	640: 100% ██████████ 46/46 [
	Class	Images	Instances	Box(P	R	mAP50 mAP50-95): 100% ██████████

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
99/100	3.16G	0.9031	0.7495	1.802	6	640: 100% ██████████ 46/46 [
	Class	Images	Instances	Box(P	R	mAP50 mAP50-95): 100% ██████████

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size
100/100	3.16G	0.8595	0.6865	1.794	6	640: 100% ██████████ 46/46 [
	Class	Images	Instances	Box(P	R	mAP50 mAP50-95): 100% ██████████

100 epochs completed in 0.372 hours.

Optimizer stripped from runs/detect/yolo10_adam_lr005/weights/last.pt, 16.5MB

Optimizer stripped from runs/detect/yolo10_adam_lr005/weights/best.pt, 16.5MB

Validating runs/detect/yolo10_adam_lr005/weights/best.pt...

Ultralytics 8.3.163 🚀 Python-3.11.13 torch-2.6.0+cu124 CUDA:0 (Tesla T4, 15095MiB)

YOLOv10s summary (fused): 106 layers, 7,222,257 parameters, 0 gradients, 21.4 GFLOPs

Class	Images	Instances	Box(P	R	mAP50	mAP50-95): 100% ██████████
all	99	99	0.866	0.902	0.937	0.814
clase0	12	12	0.78	0.583	0.668	0.495
clase1	7	7	0.706	1	0.995	0.862
clase2	10	10	0.901	0.915	0.968	0.886
clase3	15	15	1	0.775	0.912	0.857
clase4	11	11	0.954	1	0.995	0.923
clase5	7	7	0.989	1	0.995	0.912
clase6	9	9	0.766	1	0.929	0.872
clase7	3	3	0.555	1	0.995	0.93
clase8	9	9	0.876	0.787	0.876	0.798
clase9	7	7	1	0.986	0.995	0.888
clase10	9	9	1	0.88	0.975	0.526

Speed: 0.9ms preprocess, 5.0ms inference, 0.0ms loss, 0.9ms postprocess per image

Results saved to runs/detect/yolo10_adam_lr005

Entrenamiento completado! Resultados guardados en:

/content/drive/MyDrive/Colab Notebooks/LSECNuYoloII/runs/detect/yolo10 adam lr005

