```
# Step 1: Install required libraries
!pip install ultralytics roboflow
```

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Requirement already satisfied: ultralytics in /usr/local/lib/python3.12/dist-packages (8.3.235)
Requirement already satisfied: roboflow in /usr/local/lib/python3.12/dist-packages (1.2.11)
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```

```
!pip install roboflow

from roboflow import Roboflow
rf = Roboflow(api_key="LpORtHgnDdhFscxfxmmw")
project = rf.workspace("akemi").project("smoke-ddba9-zjcub")
version = project.version(1)
dataset = version.download("yolov8")
```

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Requirement already satisfied: charset_normalizer<4,>=2 in /usr/local/lib/python3.12/dist-packages (from requests->roboflow) (3.
loading Roboflow workspace...
loading Roboflow project...
Downloading Dataset Version Zip in smoke-1 to yolov8:: 100%|████████| 37103/37103 [00:01<00:00, 34921.49it/s]

Extracting Dataset Version Zip to smoke-1 in yolov8:: 100%|████████| 884/884 [00:00<00:00, 5348.70it/s]
Creating new Ultralytics Settings v0.0.6 file ✅
View Ultralytics Settings with 'yolo settings' or at '/root/.config/Ultralytics/settings.json'
Update Settings with 'yolo settings key=value', i.e. 'yolo settings runs_dir=path/to/dir'. For help see https://docs.ultralytics
```

```python
# Step 3: Train YOLOv8 on the smoke dataset

from ultralytics import YOLO
import os

# Use the folder printed above. Example: "smoke-1"
DATASET_DIR = dataset.location  # automatically uses the right folder

data_yaml_path = os.path.join(DATASET_DIR, "data.yaml")
print("Using data.yaml at:", data_yaml_path)

# Load YOLOv8 nano (fast, lightweight)
model = YOLO("yolov8n.pt")

# Train the model
model.train(
    data=data_yaml_path,
    epochs=10,       # I will increase the epochs if nessesary
    imgsz=640
)
```

```
623,    0.22723,    0.22823,    0.22923,    0.23023,    0.23123,    0.23223,    0.23323,    0.23423,
624,    0.23724,    0.23824,    0.23924,
4,      0.24124,    0.24224,    0.24324,    0.24424,    0.24525,    0.24625,    0.24725,    0.24825,
025,    0.25125,    0.25225,    0.25325,    0.25425,    0.25526,    0.25626,    0.25726,    0.25826,
026,    0.26126,    0.26226,    0.26326,
6,      0.26527,    0.26627,    0.26727,    0.26827,    0.26927,    0.27027,    0.27127,    0.27227,
427,    0.27528,    0.27628,    0.27728,    0.27828,    0.27928,    0.28028,    0.28128,    0.28228,
428,    0.28529,    0.28629,    0.28729,
9,      0.28929,    0.29029,    0.29129,    0.29229,    0.29329,    0.29429,    0.2953,     0.2963,
83,     0.2993,     0.3003,     0.3013,     0.3023,     0.3033,     0.3043,     0.30531,    0.30631,
831,    0.30931,    0.31031,    0.31131,
1,      0.31331,    0.31431,    0.31532,    0.31632,    0.31732,    0.31832,    0.31932,    0.32032,
232,    0.32332,    0.32432,    0.32533,    0.32633,    0.32733,    0.32833,    0.32933,    0.33033,
233,    0.33333,    0.33433,    0.33534,
4,      0.33734,    0.33834,    0.33934,    0.34034,    0.34134,    0.34234,    0.34334,    0.34434,
635,    0.34735,    0.34835,    0.34935,    0.35035,    0.35135,    0.35235,    0.35335,    0.35435,
636,    0.35736,    0.35836,    0.35936,
6,      0.36136,    0.36236,    0.36336,    0.36436,    0.36537,    0.36637,    0.36737,    0.36837,
037,    0.37137,    0.37237,    0.37337,    0.37437,    0.37538,    0.37638,    0.37738,    0.37838,
038,    0.38138,    0.38238,    0.38338,
8,      0.38539,    0.38639,    0.38739,    0.38839,    0.38939,    0.39039,    0.39139,    0.39239,
439,    0.3954,     0.3964,     0.3974,     0.3984,     0.3994,     0.4004,     0.4014,     0.4024,
44,     0.40541,    0.40641,    0.40741,
```

```python
# Step 4: Confirm where the trained weights are saved

import glob

weights_dir = "runs/detect/train/weights"
print("Looking for weights in:", weights_dir)
print(glob.glob(weights_dir + "/*"))
```

```
Looking for weights in: runs/detect/train/weights
['runs/detect/train/weights/last.pt', 'runs/detect/train/weights/best.pt']
```

```python
# Step 6: Download trained weights to the local machine

from google.colab import files

best_pt_path = "runs/detect/train/weights/best.pt"
print("Downloading:", best_pt_path)
files.download(best_pt_path)


# best_engine_path = "runs/detect/train/weights/best.engine"
# files.download(best_engine_path)
```

```
Downloading: runs/detect/train/weights/best.pt
```

```python
# Step 7: Test the model on one image from the validation set

from ultralytics import YOLO
import cv2
from matplotlib import pyplot as plt
import os

best_pt_path = "runs/detect/train/weights/best.pt"
model = YOLO(best_pt_path)

# Pick one image from the val set to see if can detect.
val_images_dir = os.path.join(DATASET_DIR, "valid", "images")
sample_image = os.listdir(val_images_dir)[0]
img_path = os.path.join(val_images_dir, sample_image)
print("Using sample image:", img_path)

results = model(img_path)
annotated = results[0].plot()

# result
plt.imshow(cv2.cvtColor(annotated, cv2.COLOR_BGR2RGB))
plt.axis("off")
plt.show()
```

Using sample image: /content/smoke-1/valid/images/youtube-22_jpg.rf.fc9c484c03f70730d30ccb3fd532e0ab.jpg

image 1/1 /content/smoke-1/valid/images/youtube-22_jpg.rf.fc9c484c03f70730d30ccb3fd532e0ab.jpg: 384x640 2 --------------------
Speed: 4.8ms preprocess, 186.7ms inference, 5.1ms postprocess per image at shape (1, 3, 384, 640)