



In [1]: `ROOT_DIR = '/content'`

In [2]: `!apt-get update`
`!apt-get install -y locales`

0% [Working]

```
Get:1 https://cloud.r-project.org/bin/linux/ubuntu jammy-cran40/ InRelease [3,626 B]
Get:2 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu2204/x86_64 InRelease
[1,581 B]
Get:3 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu2204/x86_64 Packages
[910 kB]
Get:4 http://security.ubuntu.com/ubuntu jammy-security InRelease [129 kB]
Hit:5 http://archive.ubuntu.com/ubuntu jammy InRelease
Get:6 http://archive.ubuntu.com/ubuntu jammy-updates InRelease [128 kB]
Ign:7 https://r2u.stat.illinois.edu/ubuntu jammy InRelease
Get:8 https://r2u.stat.illinois.edu/ubuntu jammy Release [5,713 B]
Get:9 https://r2u.stat.illinois.edu/ubuntu jammy Release.gpg [793 B]
Hit:10 https://ppa.launchpadcontent.net/deadsnakes/ppa/ubuntu jammy InRelease
Get:11 http://security.ubuntu.com/ubuntu jammy-security/main amd64 Packages [2,119 kB]
Hit:12 https://ppa.launchpadcontent.net/graphics-drivers/ppa/ubuntu jammy InRelease
Hit:13 http://archive.ubuntu.com/ubuntu jammy-backports InRelease
Hit:14 https://ppa.launchpadcontent.net/ubuntugis/ppa/ubuntu jammy InRelease
Get:15 https://r2u.stat.illinois.edu/ubuntu jammy/main amd64 Packages [2,552 kB]
Get:16 http://archive.ubuntu.com/ubuntu jammy-updates/multiverse amd64 Packages [51.8 kB]
Get:17 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 Packages [2,396 kB]
Get:18 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 Packages [1,132 kB]
Get:19 https://r2u.stat.illinois.edu/ubuntu jammy/main all Packages [8,218 kB]
Get:20 http://archive.ubuntu.com/ubuntu jammy-updates/universe amd64 Packages [1,422 kB]
Fetched 19.1 MB in 5s (3,592 kB/s)
Reading package lists... Done
W: Skipping acquire of configured file 'main/source/Sources' as repository 'https://r2u.stat.illinois.edu/ubuntu jammy InRelease' does not seem to provide it (sources.list entry miss pelt?)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
locales is already the newest version (2.35-0ubuntu3.8).
0 upgraded, 0 newly installed, 0 to remove and 49 not upgraded.
```

In [3]: `!locale-gen en_US.UTF-8`
`!update-locale LANG=en_US.UTF-8`

Generating locales (this might take a while)...
 en_US.UTF-8... done
 Generation complete.

In [4]: `import os`
`os.environ['LC_ALL'] = 'C.UTF-8'`
`os.environ['LANG'] = 'C.UTF-8'`

In [5]: `!pip install ultralytics PyYAML patool`

Collecting ultralytics
 Downloading ultralytics-8.2.74-py3-none-any.whl.metadata (41 kB)
 0.0/41.3 kB ? eta -:-:--

41.3/41.3 kB 1.3 MB/s eta 0:00:00

Requirement already satisfied: PyYAML in /usr/local/lib/python3.10/dist-packages (6.0.1)

Collecting patool

Downloading patool-2.3.0-py2.py3-none-any.whl.metadata (4.0 kB)

Requirement already satisfied: numpy<2.0.0,>=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) (3.7.1)

Requirement already satisfied: opencv-python>=4.6.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (4.10.0.84)

Requirement already satisfied: pillow>=7.1.2 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (9.4.0)

Requirement already satisfied: requests>=2.23.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (2.31.0)

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) (2.3.1+cu121)

Requirement already satisfied: torchvision>=0.9.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (0.18.1+cu121)

Requirement already satisfied: tqdm>=4.64.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (4.66.4)

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) (2.1.4)

Requirement already satisfied: seaborn>=0.11.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (0.13.1)

Collecting ultralytics-thop>=2.0.0 (from ultralytics)

Downloading ultralytics_thop-2.0.0-py3-none-any.whl.metadata (8.5 kB)

Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (1.2.1)

Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (0.12.1)

Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (4.53.1)

Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (1.4.5)

Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (24.1)

Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (3.1.2)

Requirement already satisfied: python-dateutil>=2.7 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (2.8.2)

Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-packages (from pandas>=1.1.4->ultralytics) (2024.1)

Requirement already satisfied: tzdata>=2022.1 in /usr/local/lib/python3.10/dist-packages (from pandas>=1.1.4->ultralytics) (2024.1)

Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.10/dist-packages (from requests>=2.23.0->ultralytics) (3.3.2)

Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packages (from requests>=2.23.0->ultralytics) (3.7)

Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.10/dist-packages (from requests>=2.23.0->ultralytics) (2.0.7)

Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.10/dist-packages (from requests>=2.23.0->ultralytics) (2024.7.4)

Requirement already satisfied: filelock in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (3.15.4)

Requirement already satisfied: typing-extensions>=4.8.0 in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (4.12.2)

Requirement already satisfied: sympy in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (1.13.1)

Requirement already satisfied: networkx in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (3.3)

Requirement already satisfied: jinja2 in /usr/local/lib/python3.10/dist-packages (from torch

```

h>=1.8.0->ultralytics) (3.1.4)
Requirement already satisfied: fsspec in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (2024.6.1)
Collecting nvidia-cuda-nvrtc-cu12==12.1.105 (from torch>=1.8.0->ultralytics)
  Using cached nvidia_cuda_nvrtc_cu12-12.1.105-py3-none-manylinux1_x86_64.whl.metadata (1.5 kB)
Collecting nvidia-cuda-runtime-cu12==12.1.105 (from torch>=1.8.0->ultralytics)
  Using cached nvidia_cuda_runtime_cu12-12.1.105-py3-none-manylinux1_x86_64.whl.metadata (1.5 kB)
Collecting nvidia-cuda-cupti-cu12==12.1.105 (from torch>=1.8.0->ultralytics)
  Using cached nvidia_cuda_cupti_cu12-12.1.105-py3-none-manylinux1_x86_64.whl.metadata (1.6 kB)
Collecting nvidia-cudnn-cu12==8.9.2.26 (from torch>=1.8.0->ultralytics)
  Using cached nvidia_cudnn_cu12-8.9.2.26-py3-none-manylinux1_x86_64.whl.metadata (1.6 kB)
Collecting nvidia-cublas-cu12==12.1.3.1 (from torch>=1.8.0->ultralytics)
  Using cached nvidia_cublas_cu12-12.1.3.1-py3-none-manylinux1_x86_64.whl.metadata (1.5 kB)
Collecting nvidia-cufft-cu12==11.0.2.54 (from torch>=1.8.0->ultralytics)
  Using cached nvidia_cufft_cu12-11.0.2.54-py3-none-manylinux1_x86_64.whl.metadata (1.5 kB)
Collecting nvidia-curand-cu12==10.3.2.106 (from torch>=1.8.0->ultralytics)
  Using cached nvidia_curand_cu12-10.3.2.106-py3-none-manylinux1_x86_64.whl.metadata (1.5 kB)
Collecting nvidia-cusolver-cu12==11.4.5.107 (from torch>=1.8.0->ultralytics)
  Using cached nvidia_cusolver_cu12-11.4.5.107-py3-none-manylinux1_x86_64.whl.metadata (1.6 kB)
Collecting nvidia-cuspars-cu12==12.1.0.106 (from torch>=1.8.0->ultralytics)
  Using cached nvidia_cuspars-cu12-12.1.0.106-py3-none-manylinux1_x86_64.whl.metadata (1.6 kB)
Collecting nvidia-nccl-cu12==2.20.5 (from torch>=1.8.0->ultralytics)
  Using cached nvidia_nccl_cu12-2.20.5-py3-none-manylinux2014_x86_64.whl.metadata (1.8 kB)
Collecting nvidia-nvtx-cu12==12.1.105 (from torch>=1.8.0->ultralytics)
  Using cached nvidia_nvtx_cu12-12.1.105-py3-none-manylinux1_x86_64.whl.metadata (1.7 kB)
Requirement already satisfied: triton==2.3.1 in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (2.3.1)
Collecting nvidia-nvjitlink-cu12 (from nvidia-cusolver-cu12==11.4.5.107->torch>=1.8.0->ultralytics)
  Using cached nvidia_nvjitlink_cu12-12.6.20-py3-none-manylinux2014_x86_64.whl.metadata (1.5 kB)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.10/dist-packages (from python-dateutil>=2.7->matplotlib>=3.3.0->ultralytics) (1.16.0)
Requirement already satisfied: MarkupSafe>=2.0 in /usr/local/lib/python3.10/dist-packages (from Jinja2->torch>=1.8.0->ultralytics) (2.1.5)
Requirement already satisfied: mpmath<1.4, >=1.1.0 in /usr/local/lib/python3.10/dist-packages (from sympy->torch>=1.8.0->ultralytics) (1.3.0)
Downloading ultralytics-8.2.74-py3-none-any.whl (865 kB)
      865.5/865.5 kB 15.4 MB/s eta 0:00:00
Downloading patool-2.3.0-py2.py3-none-any.whl (96 kB)
      96.6/96.6 kB 10.8 MB/s eta 0:00:00
Using cached nvidia_cublas_cu12-12.1.3.1-py3-none-manylinux1_x86_64.whl (410.6 MB)
Using cached nvidia_cuda_cupti_cu12-12.1.105-py3-none-manylinux1_x86_64.whl (14.1 MB)
Using cached nvidia_cuda_nvrtc_cu12-12.1.105-py3-none-manylinux1_x86_64.whl (23.7 MB)
Using cached nvidia_cuda_runtime_cu12-12.1.105-py3-none-manylinux1_x86_64.whl (823 kB)
Using cached nvidia_cudnn_cu12-8.9.2.26-py3-none-manylinux1_x86_64.whl (731.7 MB)
Using cached nvidia_cufft_cu12-11.0.2.54-py3-none-manylinux1_x86_64.whl (121.6 MB)
Using cached nvidia_curand_cu12-10.3.2.106-py3-none-manylinux1_x86_64.whl (56.5 MB)
Using cached nvidia_cusolver_cu12-11.4.5.107-py3-none-manylinux1_x86_64.whl (124.2 MB)
Using cached nvidia_cuspars-cu12-12.1.0.106-py3-none-manylinux1_x86_64.whl (196.0 MB)
Using cached nvidia_nccl_cu12-2.20.5-py3-none-manylinux2014_x86_64.whl (176.2 MB)
Using cached nvidia_nvtx_cu12-12.1.105-py3-none-manylinux1_x86_64.whl (99 kB)
Downloading ultralytics_thop-2.0.0-py3-none-any.whl (25 kB)
Using cached nvidia_nvjitlink_cu12-12.6.20-py3-none-manylinux2014_x86_64.whl (19.7 MB)
Installing collected packages: patool, nvidia-nvtx-cu12, nvidia-nvjitlink-cu12, nvidia-nccl-cu12, nvidia-curand-cu12, nvidia-cufft-cu12, nvidia-cuda-runtime-cu12, nvidia-cuda-nvrtc-cu12, nvidia-cuda-cupti-cu12, nvidia-cublas-cu12, nvidia-cuspars-cu12, nvidia-cudnn-cu12, nvidia-cusolver-cu12, ultralytics-thop, ultralytics
Successfully installed nvidia-cublas-cu12-12.1.3.1 nvidia-cuda-cupti-cu12-12.1.105 nvidia-cuda-nvrtc-cu12-12.1.105 nvidia-cuda-runtime-cu12-12.1.105 nvidia-cudnn-cu12-8.9.2.26 nvidia-cufft-cu12-11.0.2.54 nvidia-curand-cu12-10.3.2.106 nvidia-cusolver-cu12-11.4.5.107 nvidia-cuspars-cu12-12.1.0.106 nvidia-nccl-cu12-2.20.5 nvidia-nvjitlink-cu12-12.6.20 nvidia-nvtx-cu12-12.1.105 ultralytics-thop-2.0.0 ultralytics-8.2.74 patool-2.3.0

```

```
In [6]: # @title Check Dangerous Animals { display-mode: "form" }
zebra = False # @param {type:"boolean"}
lion = True # @param {type:"boolean"}
rhino = True # @param {type:"boolean"}
elephant = False # @param {type:"boolean"}
buffalo = False # @param {type:"boolean"}
turtle = True # @param {type:"boolean"}
ostrich = False # @param {type:"boolean"}
```

Download Dataset (Images and Labels)

```
In [7]: %%bash

file_url="https://drive.google.com/uc?export=download&id=1FrPo0bICEH8Xwuyf12TgBRycyQ6UYUt"
destination_path="/content/wildlife_detector.zip"

confirmation_page=$(curl -s -L "$file_url")

file_id=$(echo "$confirmation_page" | grep -oE "name=\"id\" value=\"[^\"]+\" | sed 's/name
file_confirm=$(echo "$confirmation_page" | grep -oE "name=\"confirm\" value=\"[^\"]+\" | s
file_uuid=$(echo "$confirmation_page" | grep -oE "name=\"uuid\" value=\"[^\"]+\" | sed 's/

download_url="https://drive.usercontent.google.com/download?id=file_id&export=download&confirm

curl -L -o "$destination_path" "$download_url"

if [ $? -eq 0 ]; then
    echo "Download completed successfully."
else
    echo "Download failed."
fi
```

Download completed successfully.

% Total	% Received	% Xferd	Average Speed	Time	Time	Time	Current
			Dload Upload	Total	Spent	Left	Speed
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
3	148M	3 4903k	0	0	2801k	0	0:00:54
30	148M	30 45.4M	0	0	19.9M	0	0:00:07
67	148M	67 100M	0	0	30.6M	0	0:00:04
100	148M	100 148M	0	0	36.7M	0	0:00:04

```
In [8]: !ls /content
```

sample_data wildlife_detector.zip

```
In [9]: import zipfile

ROOT_DIR = "/content" # Specify your desired output directory

zip_path = "/content/wildlife_detector.zip"
with zipfile.ZipFile(zip_path, 'r') as zip_ref:
    zip_ref.extractall(ROOT_DIR)
```

Train YOLO Model with Custom Animal Dataset

```
In [10]: from ultralytics import YOLO

def train_model():
    # Load a model
    model = YOLO("yolov8n.pt") # build a pre-trained model

    # Use the model
    results = model.train(data=os.path.join(ROOT_DIR, "wildlife_detector", "config.yaml"),
```

Predict Animal Labels from Animal Videos

```
In [11]: import os

from ultralytics import YOLO
import cv2

def predict_model(video_file='zebra.mp4'):
    VIDEOS_DIR = os.path.join(ROOT_DIR, "wildlife_detector", 'videos')

    video_path = os.path.join(VIDEOS_DIR, video_file)
    video_path_out = '{}_out.mp4'.format(video_path.split('.')[0])

    cap = cv2.VideoCapture(video_path)
    ret, frame = cap.read()
    H, W, _ = frame.shape
    out = cv2.VideoWriter(video_path_out, cv2.VideoWriter_fourcc(*'MP4V'), int(cap.get(cv2.

    model_path = os.path.join(ROOT_DIR, 'runs', 'detect', 'train', 'weights', 'best.pt')

    # Load a model
    model = YOLO(model_path) # Load a custom model

    threshold = 0.5

    while ret:

        results = model(frame)[0]

        for result in results.data.tolist():
            x1, y1, x2, y2, score, class_id = result

            if score > threshold:
                color = (0, 0, 255)
                if "NOT DANGEROUS" in results.names[int(class_id)].upper():
                    color = (0, 255, 0)
                cv2.rectangle(frame, (int(x1), int(y1)), (int(x2), int(y2)), color, 4)
                cv2.putText(frame, results.names[int(class_id)].upper(), (int(x1), int(y1 -
                    cv2.FONT_HERSHEY_SIMPLEX, 1.3, color, 3, cv2.LINE_AA)

            out.write(frame)
            ret, frame = cap.read()

    cap.release()
```

```
out.release()
cv2.destroyAllWindows()
```

Pre-processed Sample Animal Videos

```
In [12]: from IPython.display import HTML
from base64 import b64encode

mp4 = open('/content/wildlife_detector/videos/turtles.mp4','rb').read()
zebra_data_url = "data:video/mp4;base64," + b64encode(mp4).decode()

mp4 = open('/content/wildlife_detector/videos/elephant_zebra_ostrich.mp4','rb').read()
lion_data_url = "data:video/mp4;base64," + b64encode(mp4).decode()

mp4 = open('/content/wildlife_detector/videos/rhino_zebra.mp4','rb').read()
rhino_data_url = "data:video/mp4;base64," + b64encode(mp4).decode()

HTML("""

"" % (zebra_data_url, lion_data_url, rhino_data_url))
```

Out[12]:

Detect and Classify Animals in Videos using Model

```
In [13]: import yaml
import shutil

def predict_animal_detector(buffalo, lion, zebra, rhino, elephant, turtle, ostrich):
    # Delete Previous Runs
    shutil.rmtree('/content/runs/', ignore_errors=True)

    # Update Config based on front-end input
    with open("/content/wildlife_detector/config.yaml") as f:
        cfg = yaml.load(f, Loader=yaml.FullLoader)
        cfg['names'][0] = 'buffalo (Dangerous)' if buffalo else 'buffalo (Not Dangerous)'
        cfg['names'][1] = 'elephant (Dangerous)' if elephant else 'elephant (Not Dangerous)'
        cfg['names'][2] = 'rhino (Dangerous)' if rhino else 'rhino (Not Dangerous)'
        cfg['names'][3] = 'zebra (Dangerous)' if zebra else 'zebra (Not Dangerous)'
        cfg['names'][4] = 'lion (Dangerous)' if lion else 'lion (Not Dangerous)'
        cfg['names'][5] = 'ostrich (Dangerous)' if ostrich else 'ostrich (Not Dangerous)'
        cfg['names'][6] = 'turtle (Dangerous)' if turtle else 'turtle (Not Dangerous)'

    with open("/content/wildlife_detector/config.yaml", "w") as f:
        cfg = yaml.dump(
            cfg, stream=f, default_flow_style=False, sort_keys=False
        )

    # Train YOLO Model with user input
    train_model()

    # Take 3 sample videos and use model to detect and classify animals
    for i in ['turtles.mp4', 'elephant_zebra_ostrich.mp4', 'rhino_zebra.mp4']:
        predict_model(i)
```

```

predict_model(x)

# Convert video format to support browser
os.system("ffmpeg -i /content/wildlife_detector/videos/turtles_out.mp4 -vcodec libx264")
os.system("ffmpeg -i /content/wildlife_detector/videos/elephant_zebra_ostrich_out.mp4 -vcodec libx264")
os.system("ffmpeg -i /content/wildlife_detector/videos/rhino_zebra_out.mp4 -vcodec libx264")

predict_animal_detector(buffalo, lion, zebra, rhino, elephant, turtle, ostrich)

```

Downloading <https://github.com/ultralytics/assets/releases/download/v8.2.0/yolov8n.pt> to 'yolov8n.pt'...

100%|██████████| 6.25M/6.25M [00:00<00:00, 24.5MB/s]

Ultralytics YOLOv8.2.74 🚀 Python-3.10.12 torch-2.3.1+cu121 CUDA:0 (Tesla T4, 15102MiB)

engine/trainer: task=detect, mode=train, model=yolov8n.pt, data=/content/wildlife_detector/config.yaml, epochs=5, time=None, patience=100, batch=16, imgsz=640, save=True, save_period=-1, cache=False, device=None, workers=8, project=None, name=train, exist_ok=False, pretrained=True, optimizer=auto, verbose=True, seed=0, deterministic=True, single_cls=False, rect=False, cos_lr=False, close_mosaic=10, resume=False, amp=True, fraction=1.0, profile=False, freeze=None, multi_scale=False, overlap_mask=True, mask_ratio=4, dropout=0.0, val=True, split=val, save_json=False, save_hybrid=False, conf=None, iou=0.7, max_det=300, half=False, dnn=False, plots=True, source=None, vid_stride=1, stream_buffer=False, visualize=False, augment=False, agnostic_nms=False, classes=None, retina_masks=False, embed=None, show=False, save_frames=False, save_txt=False, save_conf=False, save_crop=False, show_labels=True, show_conf=True, show_boxes=True, line_width=None, format=torchscript, keras=False, optimize=False, int8=False, dynamic=False, simplify=False, opset=None, workspace=4, nms=False, lr0=0.01, lr_f=0.01, momentum=0.937, weight_decay=0.0005, warmup_epochs=3.0, warmup_momentum=0.8, warmup_bias_lr=0.1, box=7.5, cls=0.5, dfl=1.5, pose=12.0, kobj=1.0, label_smoothing=0.0, nbs=64, hsv_h=0.015, hsv_s=0.7, hsv_v=0.4, degrees=0.0, translate=0.1, scale=0.5, shear=0.0, perspective=0.0, flipud=0.0, fliplr=0.5, bgr=0.0, mosaic=1.0, mixup=0.0, copy_paste=0.0, auto_augment=randaugment, erasing=0.4, crop_fraction=1.0, cfg=None, tracker=botsort.yaml, save_dir=runs/detect/train

Downloading <https://ultralytics.com/assets/Arial.ttf> to '/root/.config/Ultralytics/Arial.ttf'...

100%|██████████| 755k/755k [00:00<00:00, 4.03MB/s]

Overriding model.yaml nc=80 with nc=7

	from	n	params	module	argument
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	7360	ultralytics.nn.modules.block.C2f	[32, 32,
1, True]					
3	-1	1	18560	ultralytics.nn.modules.conv.Conv	[32, 64,
3, 2]					
4	-1	2	49664	ultralytics.nn.modules.block.C2f	[64, 64,
2, True]					
5	-1	1	73984	ultralytics.nn.modules.conv.Conv	[64, 12
8, 3, 2]					
6	-1	2	197632	ultralytics.nn.modules.block.C2f	[128, 12
8, 2, True]					
7	-1	1	295424	ultralytics.nn.modules.conv.Conv	[128, 25
6, 3, 2]					
8	-1	1	460288	ultralytics.nn.modules.block.C2f	[256, 25
6, 1, True]					
9	-1	1	164608	ultralytics.nn.modules.block.SPPF	[256, 25
6, 5]					
10	-1	1	0	torch.nn.modules.upsampling.Upsample	[None,
2, 'nearest']					
11	[-1, 6]	1	0	ultralytics.nn.modules.conv.Concat	[1]
12	-1	1	148224	ultralytics.nn.modules.block.C2f	[384, 12
8, 1]					
13	-1	1	0	torch.nn.modules.upsampling.Upsample	[None,
2, 'nearest']					


```
2, nearest ]
14      [-1, 4]  1      0  ultralytics.nn.modules.conv.Concat      [1]
15      -1  1      37248  ultralytics.nn.modules.block.C2f      [192, 6
4, 1]
16      -1  1      36992  ultralytics.nn.modules.conv.Conv      [64, 64,
3, 2]
17      [-1, 12]  1      0  ultralytics.nn.modules.conv.Concat      [1]
18      -1  1      123648  ultralytics.nn.modules.block.C2f      [192, 12
8, 1]
19      -1  1      147712  ultralytics.nn.modules.conv.Conv      [128, 12
8, 3, 2]
20      [-1, 9]  1      0  ultralytics.nn.modules.conv.Concat      [1]
21      -1  1      493056  ultralytics.nn.modules.block.C2f      [384, 25
6, 1]
22      [15, 18, 21]  1      752677  ultralytics.nn.modules.head.Detect      [7, [64,
128, 256]]
Model summary: 225 layers, 3,012,213 parameters, 3,012,197 gradients, 8.2 GFLOPs
```

```
Transferred 319/355 items from pretrained weights
TensorBoard: Start with 'tensorboard --logdir runs/detect/train', view at http://localhost:
6006/
Freezing layer 'model.22.dfl.conv.weight'
AMP: running Automatic Mixed Precision (AMP) checks with YOLOv8n...
AMP: checks passed ✓
train: Scanning /content/wildlife_detector/train/labels... 1565 images, 11 backgrounds, 0 c
orrupt: 100%|██████████| 1565/1565 [00:00<00:00, 2174.01it/s]
train: New cache created: /content/wildlife_detector/train/labels.cache
augmentations: Blur(p=0.01, blur_limit=(3, 7)), MedianBlur(p=0.01, blur_limit=(3, 7)), ToG
ray(p=0.01), CLAHE(p=0.01, clip_limit=(1, 4.0), tile_grid_size=(8, 8))
/usr/lib/python3.10/multiprocessing/popen_fork.py:66: RuntimeWarning: os.fork() was called.
os.fork() is incompatible with multithreaded code, and JAX is multithreaded, so this will l
ikely lead to a deadlock.
  self.pid = os.fork()
val: Scanning /content/wildlife_detector/valid/labels... 283 images, 3 backgrounds, 0 corru
pt: 100%|██████████| 283/283 [00:00<00:00, 808.73it/s]
val: New cache created: /content/wildlife_detector/valid/labels.cache
Plotting labels to runs/detect/train/labels.jpg...
optimizer: 'optimizer=auto' found, ignoring 'lr0=0.01' and 'momentum=0.937' and determining
best 'optimizer', 'lr0' and 'momentum' automatically...
optimizer: AdamW(lr=0.000909, momentum=0.9) with parameter groups 57 weight(decay=0.0), 64
weight(decay=0.0005), 63 bias(decay=0.0)
TensorBoard: model graph visualization added ✓
Image sizes 640 train, 640 val
Using 2 dataloader workers
Logging results to runs/detect/train
Starting training for 5 epochs...
```

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size		
1/5	2.46G	0.8916	2.533	1.278	41	640: 100% ██████████		
98/98 [00:35<00:00, 2.76it/s]								
	Class	Images	Instances	Box(P	R	mAP50	mAP50-95): 1	
00% ██████████	9/9 [00:05<00:00, 1.51it/s]							
	all	283	440	0.806	0.446	0.534	0.405	
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size		
2/5	2.27G	0.9056	1.63	1.272	47	640: 100% ██████████		
98/98 [00:29<00:00, 3.29it/s]								
	Class	Images	Instances	Box(P	R	mAP50	mAP50-95): 1	
00% ██████████	9/9 [00:04<00:00, 1.98it/s]							
	all	283	440	0.76	0.67	0.679	0.479	
Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size		
3/5	2.27G	0.901	1.444	1.267	62	640: 100% ██████████		
98/98 [00:29<00:00, 3.31it/s]								
	Class	Images	Instances	Box(P	R	mAP50	mAP50-95): 1	
00% ██████████	9/9 [00:04<00:00, 1.99it/s]							
	all	283	440	0.806	0.67	0.767	0.53	


```

Epoch   GPU_mem   box_loss   cls_loss   dfl_loss   Instances   Size
4/5      2.29G     0.8702     1.297      1.228       46          640: 100%|██████████
██████| 98/98 [00:29<00:00, 3.30it/s]
Class    Images   Instances   Box(P)      R      mAP50  mAP50-95): 1
00%|██████████| 9/9 [00:04<00:00, 2.10it/s]
all      283      440        0.887      0.671    0.779    0.582

Epoch   GPU_mem   box_loss   cls_loss   dfl_loss   Instances   Size
5/5      2.29G     0.8105     1.145      1.204       44          640: 100%|██████████
██████| 98/98 [00:29<00:00, 3.38it/s]
Class    Images   Instances   Box(P)      R      mAP50  mAP50-95): 1
00%|██████████| 9/9 [00:04<00:00, 2.18it/s]
all      283      440        0.922      0.701    0.869    0.672

5 epochs completed in 0.051 hours.
Optimizer stripped from runs/detect/train/weights/last.pt, 6.2MB
Optimizer stripped from runs/detect/train/weights/best.pt, 6.2MB

```

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

Ultralytics YOLOv8.2.74 🚀 Python-3.10.12 torch-2.3.1+cu121 CUDA:0 (Tesla T4, 15102MiB)

Model summary (fused): 168 layers, 3,007,013 parameters, 0 gradients, 8.1 GFLOPs

```

Class    Images   Instances   Box(P)      R      mAP50  mAP50-95): 1
00%|██████████| 9/9 [00:04<00:00, 1.88it/s]
all      283      440        0.921      0.703    0.869    0.672
buffalo (Not Dangerous)      62      89        0.959      0.796    0.949    0.737
elephant (Not Dangerous)     53      91        0.857      0.857    0.916    0.693
rhino (Dangerous)           55      85        0.972      0.816    0.963    0.811
zebra (Not Dangerous)       59     114        0.956      0.842    0.939    0.708
lion (Dangerous)            46      51        0.85       0.941    0.879    0.684
ostrich (Not Dangerous)      3       3        0.853      0.667    0.913    0.747
turtle (Dangerous)          6       7         1         0      0.522    0.322

```

Speed: 0.3ms preprocess, 2.5ms inference, 0.0ms loss, 4.1ms postprocess per image

Results saved to **runs/detect/train**

0: 384x640 3 elephant (Not Dangerous)s, 112.4ms

Speed: 1.4ms preprocess, 112.4ms inference, 3.3ms postprocess per image at shape (1, 3, 384, 640)

0: 384x640 2 elephant (Not Dangerous)s, 9.3ms

Speed: 2.8ms preprocess, 9.3ms inference, 2.6ms postprocess per image at shape (1, 3, 384, 640)

0: 384x640 2 elephant (Not Dangerous)s, 11.2ms

Speed: 1.4ms preprocess, 11.2ms inference, 1.7ms postprocess per image at shape (1, 3, 384, 640)

0: 384x640 1 elephant (Not Dangerous), 10.8ms

Speed: 1.3ms preprocess, 10.8ms inference, 1.7ms postprocess per image at shape (1, 3, 384, 640)

0: 384x640 1 elephant (Not Dangerous), 14.2ms

Speed: 1.2ms preprocess, 14.2ms inference, 3.7ms postprocess per image at shape (1, 3, 384, 640)

0: 384x640 2 elephant (Not Dangerous)s, 10.5ms

Speed: 1.3ms preprocess, 10.5ms inference, 1.8ms postprocess per image at shape (1, 3, 384, 640)

0: 384x640 1 elephant (Not Dangerous), 9.1ms

Speed: 1.3ms preprocess, 9.1ms inference, 1.7ms postprocess per image at shape (1, 3, 384, 640)

0: 384x640 1 elephant (Not Dangerous), 10.0ms

Speed: 1.3ms preprocess, 10.0ms inference, 1.6ms postprocess per image at shape (1, 3, 384, 640)

0: 384x640 1 elephant (Not Dangerous), 9.8ms