```
1 !git clone https://github.com/kundetivamsi2001/ultralytics.git

  Cloning into 'ultralytics'...
  remote: Enumerating objects: 16184, done.
  remote: Total 16184 (delta 0), reused 0 (delta 0), pack-reused 16184
  Receiving objects: 100% (16184/16184), 8.55 MiB | 12.60 MiB/s, done.
  Resolving deltas: 100% (11164/11164), done.
```

```
1 !nvidia-smi
```

```
Fri Apr 19 10:23:32 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  68C    P8        11W /  70W |      0MiB / 15360MiB |      0%      Default |
|                                |                      |                  N/A |
+-------------------------------+----------------------+----------------------+

+-----------------------------------------------------------------------------+
| Processes:                                                                   |
|  GPU   GI   CI        PID   Type   Process name                    GPU Memory |
|        ID   ID                                                      Usage     |
|=============================================================================|
|  No running processes found                                                  |
+-----------------------------------------------------------------------------+
```

Step 1: Importing Libraries

```
1 !pip install ultralytics

  Collecting ultralytics
    Downloading ultralytics-8.2.2-py3-none-any.whl (750 kB)
       ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 750.8/750.8 kB 4.6 MB/s eta 0:00:00
  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) (4.8.0.76)
  Requirement already satisfied: pillow>=7.1.2 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (9.4.0)
  Requirement already satisfied: pyyaml>=5.3.1 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (6.0.1)
  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) (1.11.4)
  Requirement already satisfied: torch>=1.8.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (2.2.1+cu121)
  Requirement already satisfied: torchvision>=0.9.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (0.17.1+cu121)
  Requirement already satisfied: tqdm>=4.64.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (4.66.2)
  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)
  Collecting thop>=0.1.1 (from ultralytics)
    Downloading thop-0.1.1.post2209072238-py3-none-any.whl (15 kB)
  Requirement already satisfied: pandas>=1.1.4 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (2.0.3)
  Requirement already satisfied: seaborn>=0.11.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (0.13.1)
  Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (1.2
  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) (4.5
  Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (1.4
  Requirement already satisfied: numpy>=1.20 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (1.25.2)
  Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (24.0)
  Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (3.1
  Requirement already satisfied: python-dateutil>=2.7 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.3.0->ultralytics) (
  Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-packages (from pandas>=1.1.4->ultralytics) (2023.4)
  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
  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
  Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.10/dist-packages (from requests>=2.23.0->ultralytics) (202
  Requirement already satisfied: filelock in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (3.13.4)
  Requirement already satisfied: typing-extensions>=4.8.0 in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (4
  Requirement already satisfied: sympy in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (1.12)
  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>=1.8.0->ultralytics) (3.1.3)
  Requirement already satisfied: fsspec in /usr/local/lib/python3.10/dist-packages (from torch>=1.8.0->ultralytics) (2023.6.0)
  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 (23.7 MB)
  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 (823 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 (14.1 MB)
```

```
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 (731.7 MB)
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 (410.6 MB)
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 (121.6 MB)
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 (56.5 MB)
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 (124.2 MB)
Collecting nvidia-cusparse-cu12==12.1.0.106 (from torch>=1.8.0->ultralytics)
  Using cached nvidia_cusparse_cu12-12.1.0.106-py3-none-manylinux1_x86_64.whl (196.0 MB)
```

```python
1 from google.colab import drive
2 drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```python
1 %cd /content/drive/MyDrive/project/
```

```
/content/drive/MyDrive/project
```

```python
1 import os
2
3 from ultralytics import YOLO
4
5
6 # Load a model
7 model = YOLO("yolov8s.yaml")  # build a new model from scratch
8
```

```python
1 model = YOLO('yolov8s.pt')
```

Step 2: Model Training

```python
1 # Train the model
2 results = model.train(data='/content/drive/MyDrive/project/Data/data.yaml', epochs=70, imgsz=640)
```

```
        Epoch    GPU_mem    box_loss    cls_loss    dfl_loss   Instances      Size

        Epoch    GPU_mem    box_loss    cls_loss    dfl_loss   Instances      Size
        60/70     2.28G      0.9531      0.7123       1.355          24        640: 100%|██████████| 169/169 [01:02<00:00,  2.70it/s]

                  Class     Images   Instances      Box(P           R       mAP50  mAP50-95): 100%|██████████| 19/19 [00:08<00:00,  2.30it
                    all        578         828      0.869        0.76       0.846        0.551


    Closing dataloader mosaic
    Closing dataloader mosaic
    albumentations: Blur(p=0.01, blur_limit=(3, 7)), MedianBlur(p=0.01, blur_limit=(3, 7)), ToGray(p=0.01), CLAHE(p=0.01, clip_limit=(1, ∠
    albumentations: Blur(p=0.01, blur_limit=(3, 7)), MedianBlur(p=0.01, blur_limit=(3, 7)), ToGray(p=0.01), CLAHE(p=0.01, clip_limit=(1, ∠

        Epoch    GPU_mem    box_loss    cls_loss    dfl_loss   Instances      Size
```

```
1 Start coding or generate with AI.
```

```
1 import locale
2 print(locale.getpreferredencoding())
```
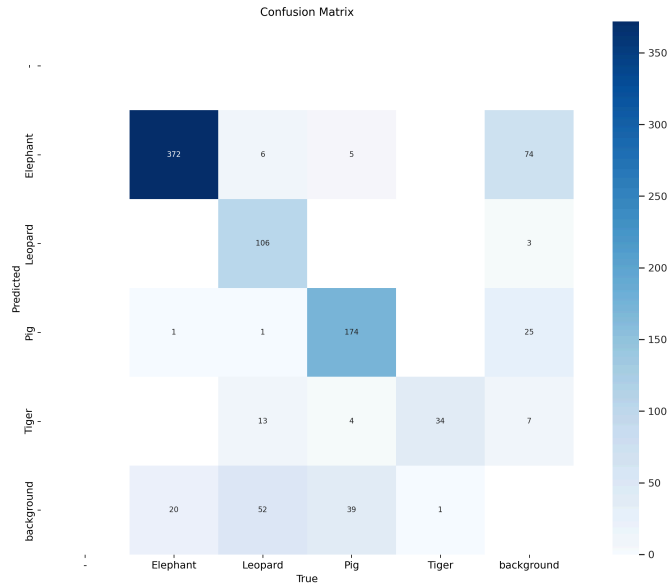
```
    ANSI_X3.4-1968
```

```
1 import locale
2 def getpreferredencoding(do_setlocale = True):
3     return "UTF-8"
4 locale.getpreferredencoding = getpreferredencoding
```

```
1 !ls runs/detect/train/weights/
2
```
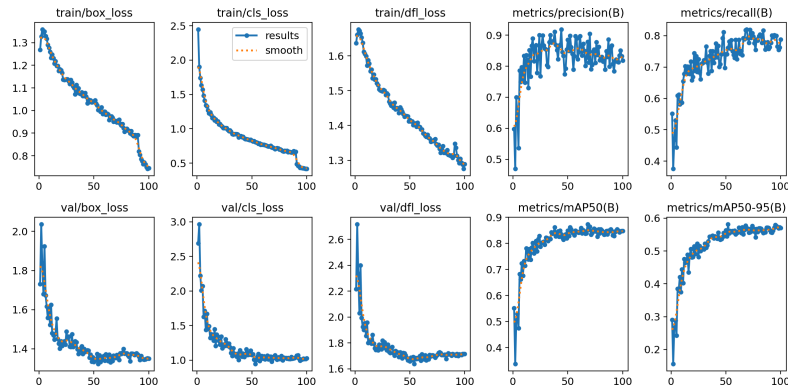
```
    best.pt  last.pt
```

```
1 from IPython.display import display, Image
2
3 Image(filename='runs/detect/train/confusion_matrix.png', width=600)
4
```
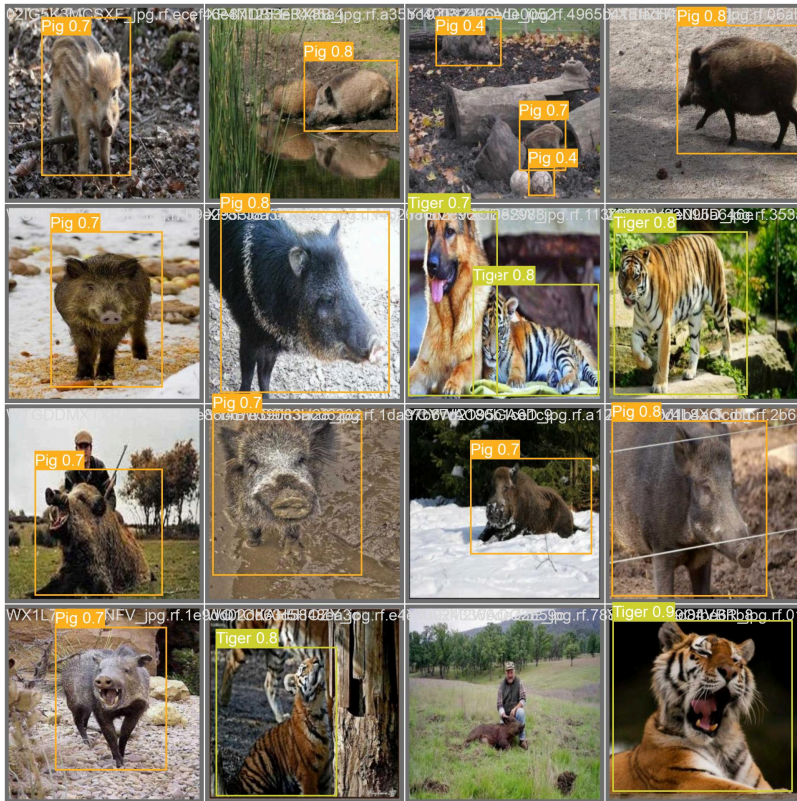


```
1 Image(filename='runs/detect/train/results.png', width=600)
2
```

```
1 Image(filename='runs/detect/train/val_batch0_pred.jpg', width=600)
2
```



```
1 !yolo task=detect mode=val model=runs/detect/train/weights/best.pt data='/content/drive/MyDrive/project/Data/data.yaml'
2
```

```
Ultralytics YOLOv8.1.19 🚀 Python-3.10.12 torch-2.1.0+cu121 CUDA:0 (Tesla T4, 15102MiB)
Model summary (fused): 168 layers, 3006623 parameters, 0 gradients, 8.1 GFLOPs
val: Scanning /content/drive/MyDrive/project/Data/valid/labels.cache... 578 images, 0 backgrounds, 0 corrupt: 100% 578/578 [00:00<?, ?it
                 Class     Images  Instances      Box(P          R      mAP50   mAP50-95): 100% 37/37 [00:11<00:00,  3.28it/s]
                   all        578        828      0.898      0.761      0.862      0.581
              Elephant        578        393      0.885      0.906      0.951      0.698
               Leopard        578        178          1      0.556      0.719      0.413
                   Pig        578        222       0.95      0.682      0.838      0.471
                 Tiger        578         35      0.759      0.901      0.942      0.742
Speed: 0.7ms preprocess, 5.3ms inference, 0.0ms loss, 2.9ms postprocess per image
Results saved to runs/detect/val4
💡 Learn more at https://docs.ultralytics.com/modes/val
```

```
1 !yolo task=detect mode=predict model=runs/detect/train/weights/best.pt conf=0.25 source='/content/drive/MyDrive/project/Data/test/images'
2
```

```
image 465/567 /content/drive/MyDrive/project/Data/test/images/P9X1244Z0408_jpg.rf.3186485f06abaad4cde7bf7834b21705.jpg: 640x640 1 Tige
image 466/567 /content/drive/MyDrive/project/Data/test/images/PQSVGLUP3BYJ_jpg.rf.e114dea71a7eb969d2cebc1022b0e88a.jpg: 640x640 2 Tige
image 467/567 /content/drive/MyDrive/project/Data/test/images/Q4NTPX2T3007_jpg.rf.5fea1b97148d7095d1a7ca583275b93b.jpg: 640x640 1 Tige
image 468/567 /content/drive/MyDrive/project/Data/test/images/Q8VK413B6P5P_jpg.rf.3253152b8a3671f531d4f00baa0ea474.jpg: 640x640 1 Tige
image 469/567 /content/drive/MyDrive/project/Data/test/images/QAI74QPKFJYL_jpg.rf.de0aa29fef6e1f7285d926decb3a9138.jpg: 640x640 1 Tige
image 470/567 /content/drive/MyDrive/project/Data/test/images/QHT70K72140C_jpg.rf.7292a3b1dd063753ad837f8e9bd58593.jpg: 640x640 1 Tige
image 471/567 /content/drive/MyDrive/project/Data/test/images/QVVFYVHNPY4P_jpg.rf.be4a32764d283dcb837f7dfde8716d66.jpg: 640x640 1 Tige
image 472/567 /content/drive/MyDrive/project/Data/test/images/QYLZ57CZ2DJP_jpg.rf.dcd7b005e93e487bb2b0c1e14201b9b4.jpg: 640x640 2 Tige
image 473/567 /content/drive/MyDrive/project/Data/test/images/R33F8U8YI5VO_jpg.rf.6cc5046a4cbcfd8efc1c86a3367be906.jpg: 640x640 1 Tige
image 474/567 /content/drive/MyDrive/project/Data/test/images/R5CZPBELUIY8_jpg.rf.3ea8259f6cc3d3d5fe67cdf0cf7fec84.jpg: 640x640 1 Tige
image 475/567 /content/drive/MyDrive/project/Data/test/images/R5IHZ53VF091_jpg.rf.6a75af3a693f2d86e2406fa867d8b932.jpg: 640x640 1 Tige
image 476/567 /content/drive/MyDrive/project/Data/test/images/R9IDFBQTI3XB_jpg.rf.420ec49ea8f3be5181b0ce88c412c411.jpg: 640x640 2 Tige
image 477/567 /content/drive/MyDrive/project/Data/test/images/RGDK0KYUWT8F_jpg.rf.8a28792eddf96c6a0d0e68ed91a250e4.jpg: 640x640 1 Tige
image 478/567 /content/drive/MyDrive/project/Data/test/images/RLJBY78FHTKT_jpg.rf.d68492deccbcf21579edd7c4e03a6714.jpg: 640x640 1 Tige
image 479/567 /content/drive/MyDrive/project/Data/test/images/ROWXJZYYN11Q_jpg.rf.fedd6388226dd5b31f499ab050754f77.jpg: 640x640 1 Tige
image 480/567 /content/drive/MyDrive/project/Data/test/images/RPPP2AMO5FWB_jpg.rf.e4c8506e4e140d38035e740eb3b5ba93.jpg: 640x640 2 Tige
image 481/567 /content/drive/MyDrive/project/Data/test/images/S8ZWTJCB32TY_jpg.rf.e69b179310c2566c5d4bebd957af254b.jpg: 640x640 2 Tige
image 482/567 /content/drive/MyDrive/project/Data/test/images/S9VJWF3CFDBW_jpg.rf.a3330e4d39457f97cedaaae8b59fbf46.jpg: 640x640 1 Tige
image 483/567 /content/drive/MyDrive/project/Data/test/images/SCTVOWQETN0H_jpg.rf.0deac47c55383aa308277accd628dd6d.jpg: 640x640 1 Tige
image 484/567 /content/drive/MyDrive/project/Data/test/images/SE6IV9EKH7DC_jpg.rf.d9a39dcdb4c55a984288bd36cc7abcff.jpg: 640x640 1 Tige
image 485/567 /content/drive/MyDrive/project/Data/test/images/SKHLN7NMU2J4_jpg.rf.3c096a8e9e7c96f3fdb2e0b367571c8d.jpg: 640x640 1 Tige
image 486/567 /content/drive/MyDrive/project/Data/test/images/STX0663Z5XRT_jpg.rf.e53e41d7075c68402df163dabf91f57b.jpg: 640x640 1 Tige
image 487/567 /content/drive/MyDrive/project/Data/test/images/TLLXEOUA7KBE_jpg.rf.ced763b9dcf8ea67f7da304c007da185.jpg: 640x640 3 Tige
image 488/567 /content/drive/MyDrive/project/Data/test/images/TUHBRV3ON09M_jpg.rf.7381ea01b6a0d414113d2a221139dec8.jpg: 640x640 1 Elep
image 489/567 /content/drive/MyDrive/project/Data/test/images/TYAQUQ7J2843_jpg.rf.a530cc8d923797bffe5f28ac0a39799c.jpg: 640x640 1 Tige
image 490/567 /content/drive/MyDrive/project/Data/test/images/U4C8FF21DT35_jpg.rf.e4e58a549d24a49a9c7cb2e61b3d3780.jpg: 640x640 1 Tige
image 491/567 /content/drive/MyDrive/project/Data/test/images/U7UYED0ZKF5O_jpg.rf.7bd6c940c9828496d6cb13488aec1424.jpg: 640x640 1 Tige
image 492/567 /content/drive/MyDrive/project/Data/test/images/U7VJMR5MFRF8_jpg.rf.b13ee0b881624a556f4068597fadcf54.jpg: 640x640 2 Tige
image 493/567 /content/drive/MyDrive/project/Data/test/images/UFY8GNTBVW15_jpg.rf.76f40d3f35d0c1066084414d738ffceb.jpg: 640x640 1 Tige
image 494/567 /content/drive/MyDrive/project/Data/test/images/UHI8ANMHSW33_jpg.rf.ab27d734f6f743b56429127967a5960a.jpg: 640x640 1 Tige
image 495/567 /content/drive/MyDrive/project/Data/test/images/UL9JPCER48J2_jpg.rf.a27a89fdf6e93978dce9f9a9c3c8a2a4.jpg: 640x640 2 Tige
image 496/567 /content/drive/MyDrive/project/Data/test/images/UOZDRWXZLIUR_jpg.rf.d82240a5e6d9632a128eaa403ba80c4f.jpg: 640x640 2 Tige
image 497/567 /content/drive/MyDrive/project/Data/test/images/V2R0MHMRUTTD_jpg.rf.960ee50d398b897a2132663c5ac482f7.jpg: 640x640 1 Tige
image 498/567 /content/drive/MyDrive/project/Data/test/images/VBCBH7W9NLD2_jpg.rf.c6e4521bbe3fb0d13e1bd98d593a9b2c.jpg: 640x640 1 Tige
image 499/567 /content/drive/MyDrive/project/Data/test/images/VDEVUYIDIUWF_jpg.rf.7fb3fae49dc54d6f51fb4bc2f4690c49.jpg: 640x640 1 Tige
image 500/567 /content/drive/MyDrive/project/Data/test/images/VEOVLA324NL6_jpg.rf.8da91760f4b223d7042b12c185b84334.jpg: 640x640 1 Tige
image 501/567 /content/drive/MyDrive/project/Data/test/images/VUC6MDN3FAA3_jpg.rf.965c9a70db1d69965841b22413dca872.jpg: 640x640 1 Tige
image 502/567 /content/drive/MyDrive/project/Data/test/images/VWV34L1XNRDQ_jpg.rf.4b31cae0d00101add20b1e2c7f75908a.jpg: 640x640 1 Tige
image 503/567 /content/drive/MyDrive/project/Data/test/images/W4W3F7V76ZT8_jpg.rf.3d805d5fce9b0aafe278a7675b5f7789.jpg: 640x640 1 Tige
image 504/567 /content/drive/MyDrive/project/Data/test/images/W8G7V2B6C5LY_jpg.rf.ba9a84b2060a69b48b553d0657646fe1.jpg: 640x640 1 Tige
image 505/567 /content/drive/MyDrive/project/Data/test/images/WDUKDKBUVRN0_jpg.rf.80551cea05310874b145ae91ec3599ca.jpg: 640x640 1 Tige
image 506/567 /content/drive/MyDrive/project/Data/test/images/WGZYOV7YECIQ_jpg.rf.217b37376bc99ee2c7023be8ba0337c4.jpg: 640x640 1 Tige
image 507/567 /content/drive/MyDrive/project/Data/test/images/WZ7PF1FD3NHH_jpg.rf.91ee081dd939ae256c92e46def8a5428.jpg: 640x640 1 Tige
image 508/567 /content/drive/MyDrive/project/Data/test/images/X1E1TH3265TU_jpg.rf.3dc5f27869b1c3d8595e62c6a952c3d2.jpg: 640x640 1 Tige
image 509/567 /content/drive/MyDrive/project/Data/test/images/X5PID6NMW0OX_jpg.rf.00abbf4a4f67820dae843bb1ec5f6d79.jpg: 640x640 1 Tige
image 510/567 /content/drive/MyDrive/project/Data/test/images/X62VD9R6AFC0_jpg.rf.d2b3857d94537e8caea05c1986fe3f6c.jpg: 640x640 1 Tige
image 511/567 /content/drive/MyDrive/project/Data/test/images/XBLJJ4CSH7IV_jpg.rf.8736bf65856bbfcb96c745aefe5533e1.jpg: 640x640 3 Tige
image 512/567 /content/drive/MyDrive/project/Data/test/images/XU4WMTMSUD9Y_jpg.rf.3626d41003d40ae635c09862382da574.jpg: 640x640 1 Tige
image 513/567 /content/drive/MyDrive/project/Data/test/images/YNFFUF1F5EQI_jpg.rf.98e50f6e1198f4db60e7ab5ea22c28e4.jpg: 640x640 1 Tige
image 514/567 /content/drive/MyDrive/project/Data/test/images/YNHMFU2P5BPT_jpg.rf.24b7433411bea893b7d62a3d3c68b524.jpg: 640x640 2 Tige
image 515/567 /content/drive/MyDrive/project/Data/test/images/YOZ3S3T3I79E_jpg.rf.e558979fa9723afc1f4f293d44280e2e.jpg: 640x640 1 Tige
image 516/567 /content/drive/MyDrive/project/Data/test/images/YR5PD6QZKWQ9_jpg.rf.1c1ac608a0f7ef9cd6e1e23eaa913333.jpg: 640x640 1 Tige
image 517/567 /content/drive/MyDrive/project/Data/test/images/ZG539UG1H67U_jpg.rf.ea130add572e523f1c1fed08bd92e195.jpg: 640x640 1 Tige
```

```
1 import glob
2 from IPython.display import Image, display
3
4 for image_path in glob.glob('runs/detect/predict/*.jpg')[:10]:
5     display(Image(filename=image_path, width=600))
6     print("\n")
7
```