

Configuration Manual

MSc Research Project
MSc in Data Analytics

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MSc Project Submission Sheet
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Module: MSc Research Practicum Part 2
Lecturer: Dr Abdul Qayum
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I hereby certify that the information contained in this (my submission) is information pertaining to research I conducted for this project. All information other than my own contribution will be fully referenced and listed in the relevant bibliography section at the rear of the project.

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Signature: Rahul Koguri
Date: 28-01-2026

PLEASE READ THE FOLLOWING INSTRUCTIONS AND CHECKLIST

Attach a completed copy of this sheet to each project (including multiple copies)	☐
Attach a Moodle submission receipt of the online project submission, to each project (including multiple copies).	☐
You must ensure that you retain a HARD COPY of the project, both for your own reference and in case a project is lost or mislaid. It is not sufficient to keep a copy on computer.	☐

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Configuration Manual

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Introduction

This project evaluates four YOLO models (versions 8, 10, 11, and 12) using four medical datasets, resulting in 16 total model-dataset combinations. Examples for each combination are provided below.

1. Setting up access to Google Drive from Colab.

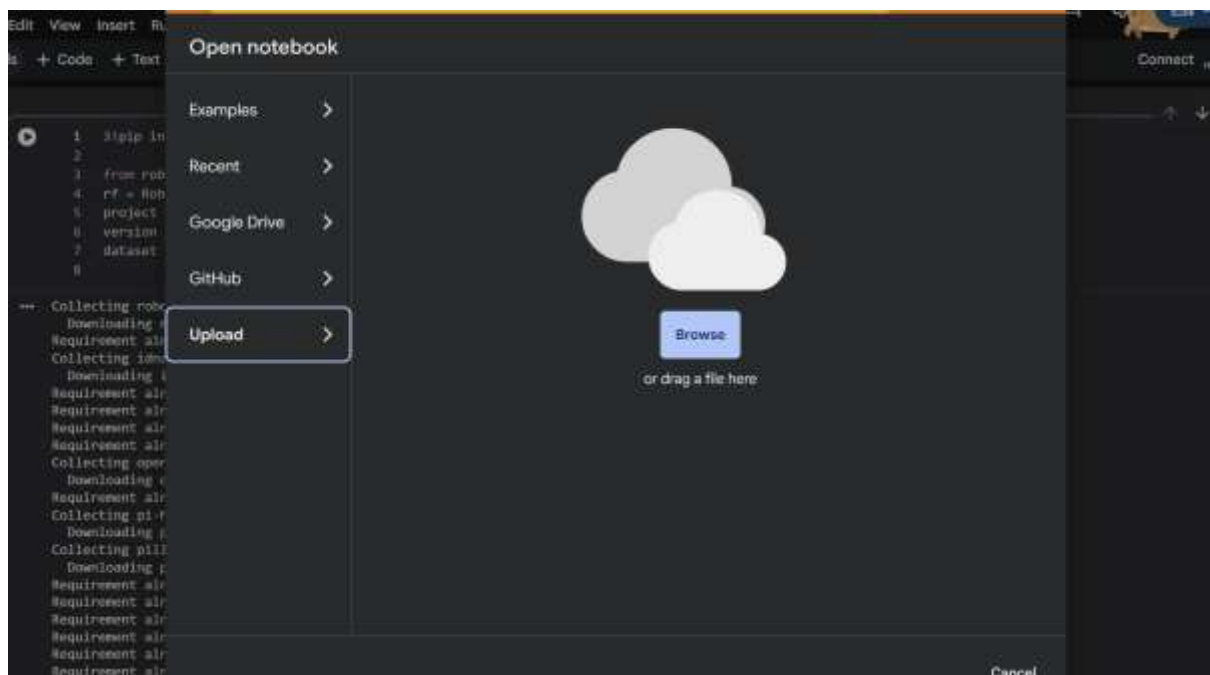
Step 1 : Launching the colab environment (navigating to google colab website)

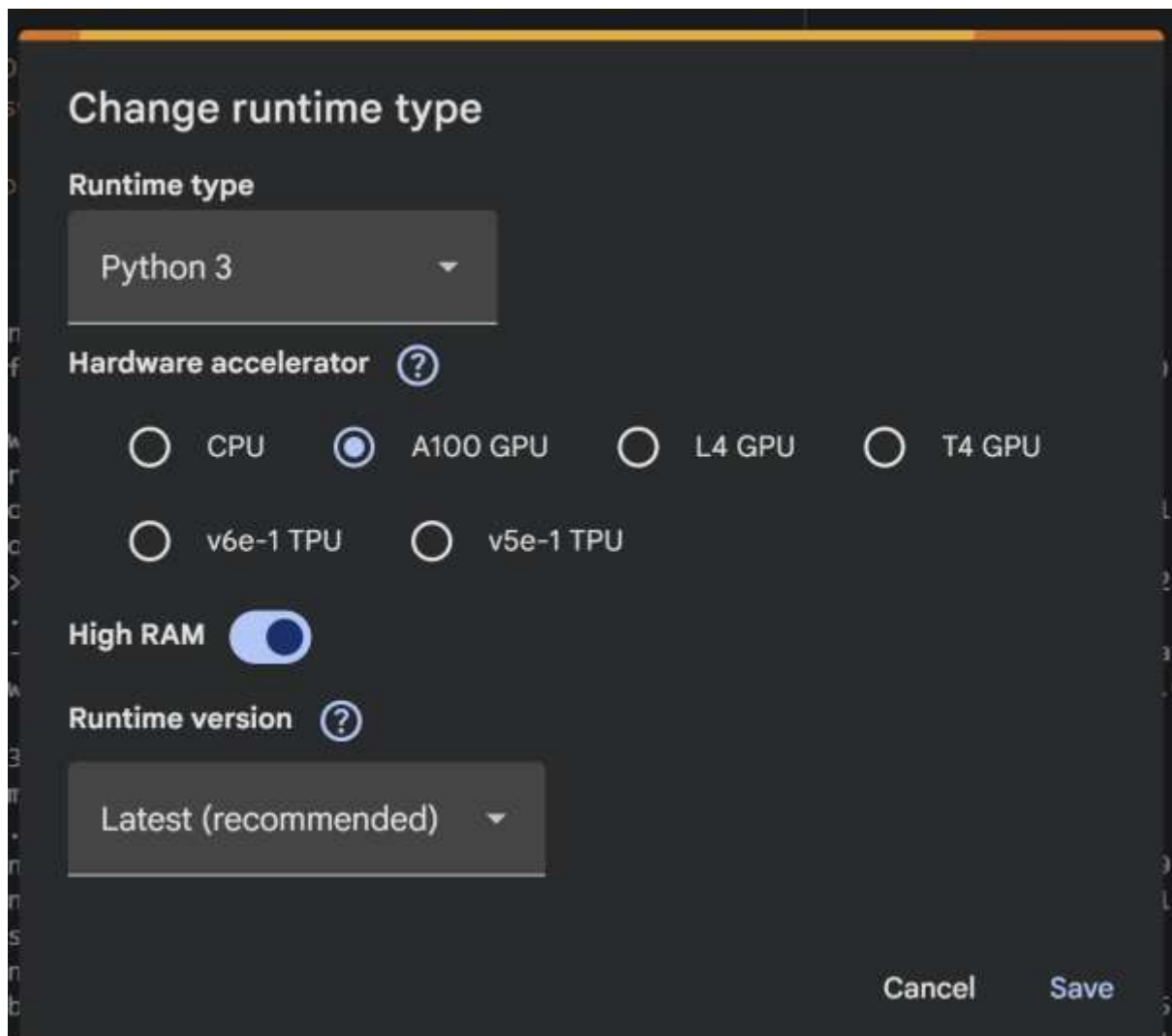
Step 2: Sign in into the google account

Step 3:uploading the ipynb file /notebook

Step 4: Enabling the GPU Acceleration (in this change the runtime)

Step 5 : change the hardware accelerator to T4 GPU





2. Configuring the session

Step 1: open the google colab session

Step 2: Sign in to your Gmail

Step 3: start a new note book

Step 4 : Activate the GPU acceleration

Step 5: Create a folder on the website

1. Installing DataSet 1 from roboflow
2. Installing DataSet 2 from roboflow
3. Installing DataSet 3 from roboflow
4. Installing DataSet 4 from Roboflow

```
1 !pip install roboflow
2
3 from roboflow import RoboFlow
4 rf = RoboFlow(api_key="Dz4MF0Z7WQ1z0g5w6Q")
5 project = rf.workspace("thesiswork-c8b4e").project("labeled-mri-brain-tumor-dataset-yocrn")
6 version = project.version(1)
7 dataset = version.download("yolo11b")
8
--- Collecting roboflow
  Downloading roboflow-1.2.11-py3-none-any.whl.metadata (9.7 kB)
Requirement already satisfied: certifi in /usr/local/lib/python3.12/dist-packages (from roboflow) (2025.11.12)
Collecting idna==3.7 (from roboflow)
  Downloading idna-3.7-py3-none-any.whl.metadata (9.9 kB)
Requirement already satisfied: cytoolz in /usr/local/lib/python3.12/dist-packages (from roboflow) (0.12.1)
Requirement already satisfied: kiwisolver in /usr/local/lib/python3.12/dist-packages (from roboflow) (1.4.9)
Requirement already satisfied: matplotlib in /usr/local/lib/python3.12/dist-packages (from roboflow) (3.10.0)
Requirement already satisfied: numpy>=1.18.5 in /usr/local/lib/python3.12/dist-packages (from roboflow) (2.0.2)
Collecting opencv-python-headless==4.10.0.84 (from roboflow)
  Downloading opencv-python-headless-4.10.0.84-cp37-abi3-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (20 kB)
Requirement already satisfied: Pillow==7.1.2 in /usr/local/lib/python3.12/dist-packages (from roboflow) (11.1.0)
Collecting pl-helf2 (from roboflow)
  Downloading pl-helf-1.1.1-cp312-cp312-manylinux_2_27_x86_64.manylinux_2_28_x86_64.whl.metadata (6.5 kB)
Collecting pillow-avif-plugin2 (from roboflow)
  Downloading pillow_avif_plugin-1.5.2-cp312-cp312-manylinux_2_28_x86_64.whl.metadata (2.1 kB)
Requirement already satisfied: python-dateutil in /usr/local/lib/python3.12/dist-packages (from roboflow) (2.9.0.post0)
Requirement already satisfied: python-dotenv in /usr/local/lib/python3.12/dist-packages (from roboflow) (1.2.1)
Requirement already satisfied: requests in /usr/local/lib/python3.12/dist-packages (from roboflow) (2.32.4)
Requirement already satisfied: six in /usr/local/lib/python3.12/dist-packages (from roboflow) (1.17.0)
Requirement already satisfied: urllib3==1.26.6 in /usr/local/lib/python3.12/dist-packages (from roboflow) (2.5.0)
```

Now we keep run with this YOLO run models

Note : Similarly for the other data sets with other models we can follow

3. Data Set Loading and Preprocessing

Step 1: Loading Data set one into the Yolo 8 (Labeled-MRI-Brain-Tumor-Dataset-1)

```
1
2 # =====
3 # Configuration and Data Loading
4 # =====
5
6 # load dataset configuration
7 yaml_path = '/content/Labeled-MRI-Brain-Tumor-Dataset-1/data.yaml'
8 with open(yaml_path, 'r') as f:
9     config = yaml.safe_load(f)
10
11 class_names = config['names']
12 num_classes = config['nc']
13 train_path = config['train']
14 val_path = config['val']
15 test_path = config['test']
16
17 print("-" * 60)
18 print("Brain Tumor MRI Dataset Analysis")
19 print("-" * 60)
20 print(f"Classes: {class_names}")
21 print(f"Number of classes: {num_classes}")
22
23
```

Step 2: Loading the Data Set 2 into YOLO 12 (Liver Disease -2)

```

1
2 # =====
3 # Configuration and Data Loading
4 # =====
5
6 # Load dataset configuration
7 yaml_path = '/content/liver-disease-2/data.yaml'
8 with open(yaml_path, 'r') as f:
9     config = yaml.safe_load(f)
10
11 class_names = config['names']
12 num_classes = config['nc']
13 train_path = config['train']
14 val_path = config['val']
15 test_path = config['test']
16
17 print("=" * 60)
18 print("Brain Tumor MRI Dataset Analysis")
19 print("=" * 60)
20 print(f"Classes: {class_names}")
21 print(f"Number of classes: {num_classes}")
22
23

```

Step 3: Loading the Data Set 3 into YOLO 11(Chest x ray images-1)

```

1
2 # =====
3 # Configuration and Data Loading
4 # =====
5
6 # Load dataset configuration
7 yaml_path = '/content/chest-x-ray-images-1/data.yaml'
8 with open(yaml_path, 'r') as f:
9     config = yaml.safe_load(f)
10
11 class_names = config['names']
12 num_classes = config['nc']
13 train_path = config['train']
14 val_path = config['val']
15 test_path = config['test']
16
17 print("=" * 60)
18 print("Dataset Analysis")
19 print("=" * 60)
20 print(f"Classes: {class_names}")
21 print(f"Number of classes: {num_classes}")
22
23

```

Step 4 : Loading the Dataset 4 into YOLO 10 (Bone fracture-1)

```

1 # =====
2 # Configuration and Data Loading
3 # =====
4
5 # Load dataset configuration
6 yaml_path = '/content/bone-fracture-1/data.yaml'
7 with open(yaml_path, 'r') as f:
8     config = yaml.safe_load(f)
9
10 class_names = config['names']
11 num_classes = config['nc']
12 train_path = config['train']
13 val_path = config['val']
14 test_path = config['test']
15
16 print("-" * 60)
17 print("Brain Tumor MRI Dataset Analysis")
18 print("-" * 60)
19 print(f"Classes: {class_names}")
20 print(f"Number of classes: {num_classes}")

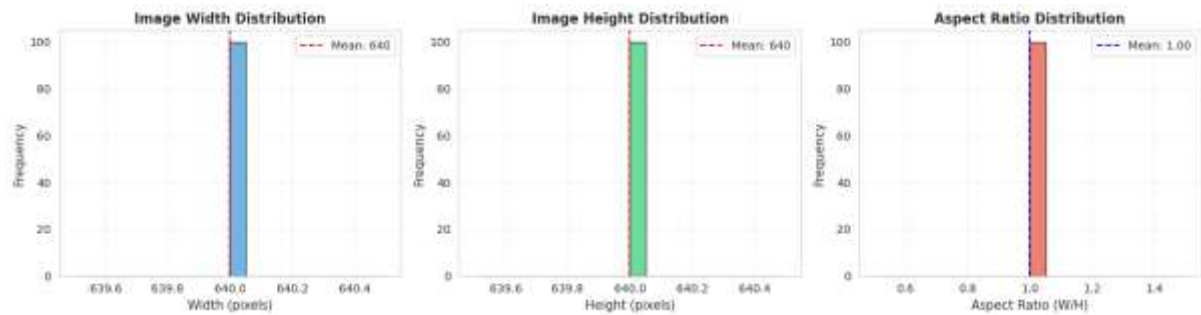
```

NOTE : Now similarly change dataset paths vies verse (you will get 16 combinations) the process will be same for all

4. Final Results



YOLO 8 Data set 1 Results



```

1
2
3 # Load Pre-trained YOLOv8 Medium Model
4
5
6 print("\n" + "=" * 70)
7 print("Step 1: Loading YOLOv8 Medium Pre-trained Model")
8 print("=" * 70)
9
10 model = YOLO('yolov8m.pt') # Load YOLOv8 medium variant
11
12 print("YOLOv8m model loaded successfully")
13 print(f"Model parameters: {sum(p.numel() for p in model.model.parameters()):,}")
14
15
=====
Step 1: Loading YOLOv8 Medium Pre-trained Model
=====
Downloading https://github.com/ultralytics/assets/releases/download/v8.3.0/yolov8m.pt to 'yolov8m.pt': 100% 49.7MB 95.6MB/s 0.5s
YOLOv8m model loaded successfully
Model parameters: 25,902,640

```

```

val: Scanning /content/Labeled-MRI-Brain-Tumor-Dataset-1/valid/labels... 502 images, 0 backgrounds, 0 corrupt: 100% 502/502
*** val: New cache created: /content/Labeled-MRI-Brain-Tumor-Dataset-1/valid/labels.cache
Plotting labels to /content/brain_tumor_detection/yolov8m_run/labels.jpg...
optimizer: 'optimizer=auto' found, ignoring 'lr=0.01' and 'momentum=0.937' and determining best 'optimizer', 'lr' and 'momentum' auto
optimizer: Adam(lr=0.00125, momentum=0.9) with parameter groups 77 weight(decay=0.0), 84 weight(decay=0.0005), 83 bias(decay=0.0)
Image sizes 640 train, 640 val
Using 8 dataloader workers
Logging results to /content/brain_tumor_detection/yolov8m_run
Starting training for 100 epochs...

Epoch  GPU_mem  box_loss  cls_loss  dfl_loss  Instances  Size
1/100   6.09G    1.781    2.456    1.89      23         640: 100% 318/318 3.21t/s 1:40
      Class  Images  Instances  Box(P  R      mAP50  mAP50-95): 100% 16/16 3.11t/s 5.2s
      all    502     505     0.542  0.535  0.481  0.183

Epoch  GPU_mem  box_loss  cls_loss  dfl_loss  Instances  Size
2/100   6.81G    1.798    1.822    1.891     28         640: 100% 318/318 3.31t/s 1:37
      Class  Images  Instances  Box(P  R      mAP50  mAP50-95): 100% 16/16 3.71t/s 4.3s
      all    502     505     0.641  0.571  0.645  0.302

Epoch  GPU_mem  box_loss  cls_loss  dfl_loss  Instances  Size
3/100   6.88G    1.743    1.646    1.831     24         640: 100% 318/318 3.31t/s 1:36
      Class  Images  Instances  Box(P  R      mAP50  mAP50-95): 100% 16/16 3.71t/s 4.3s
      all    502     505     0.665  0.693  0.723  0.301

Epoch  GPU_mem  box_loss  cls_loss  dfl_loss  Instances  Size
4/100   6.95G    1.705    1.577    1.785     21         640: 100% 318/318 3.31t/s 1:36

```

YOLO 12 Data Set 2 Results

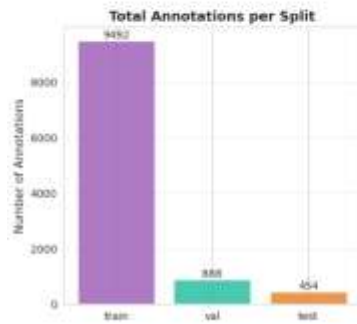
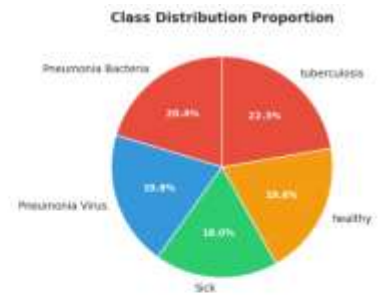
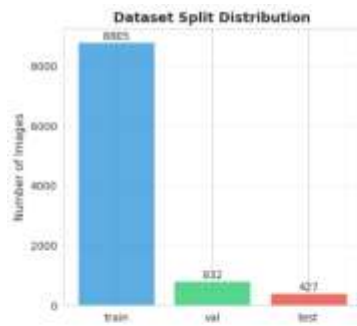


```
Model: YOLOv12n (Medium variant)
Epochs: 180
Batch Size: 64
Image Size: 648
Device: GPU
Early Stopping Patience: 20 epochs

1
2 # -----
3 # Load Pre-trained YOLOv8 Medium Model
4 # -----
5 print("Step 1: Loading YOLOv12 Medium Pre-trained Model")
6
7 model = YOLO('yolo12n.pt') # Load YOLOv8 medium variant
8
9 print("YOLOv12n model loaded successfully")
10 print(f"Model parameters: {sum(p.numel() for p in model.model.parameters()):,}")
11
12

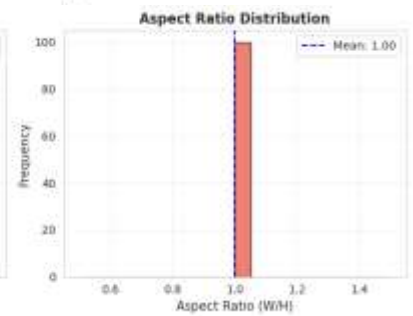
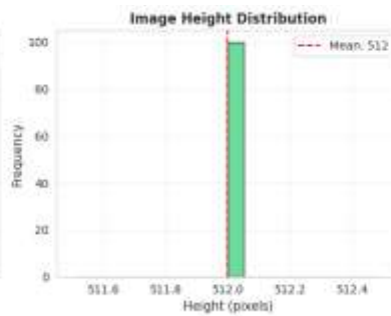
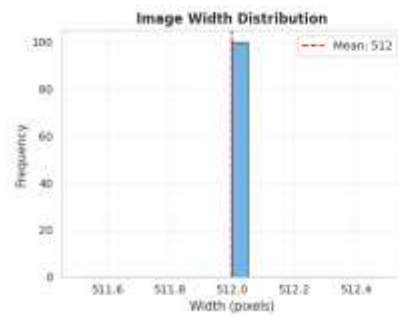
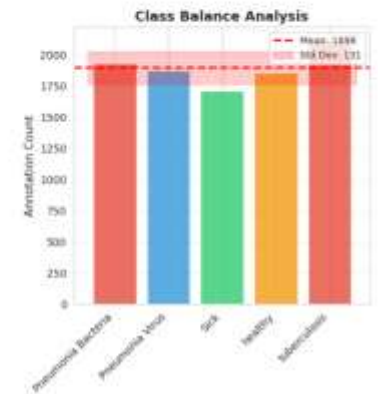
Step 1: Loading YOLOv12 Medium Pre-trained Model
Downloading https://github.com/ultralytics/assets/releases/download/v8.1.0/yolo12n.pt to 'yolo12n.pt': 100% ----- 39.0MB 28.6MB/s 1.4s
YOLOv12n model loaded successfully
Model parameters: 20,281,216
```

YOLO 11 Data Set 3



Dataset Statistics Summary

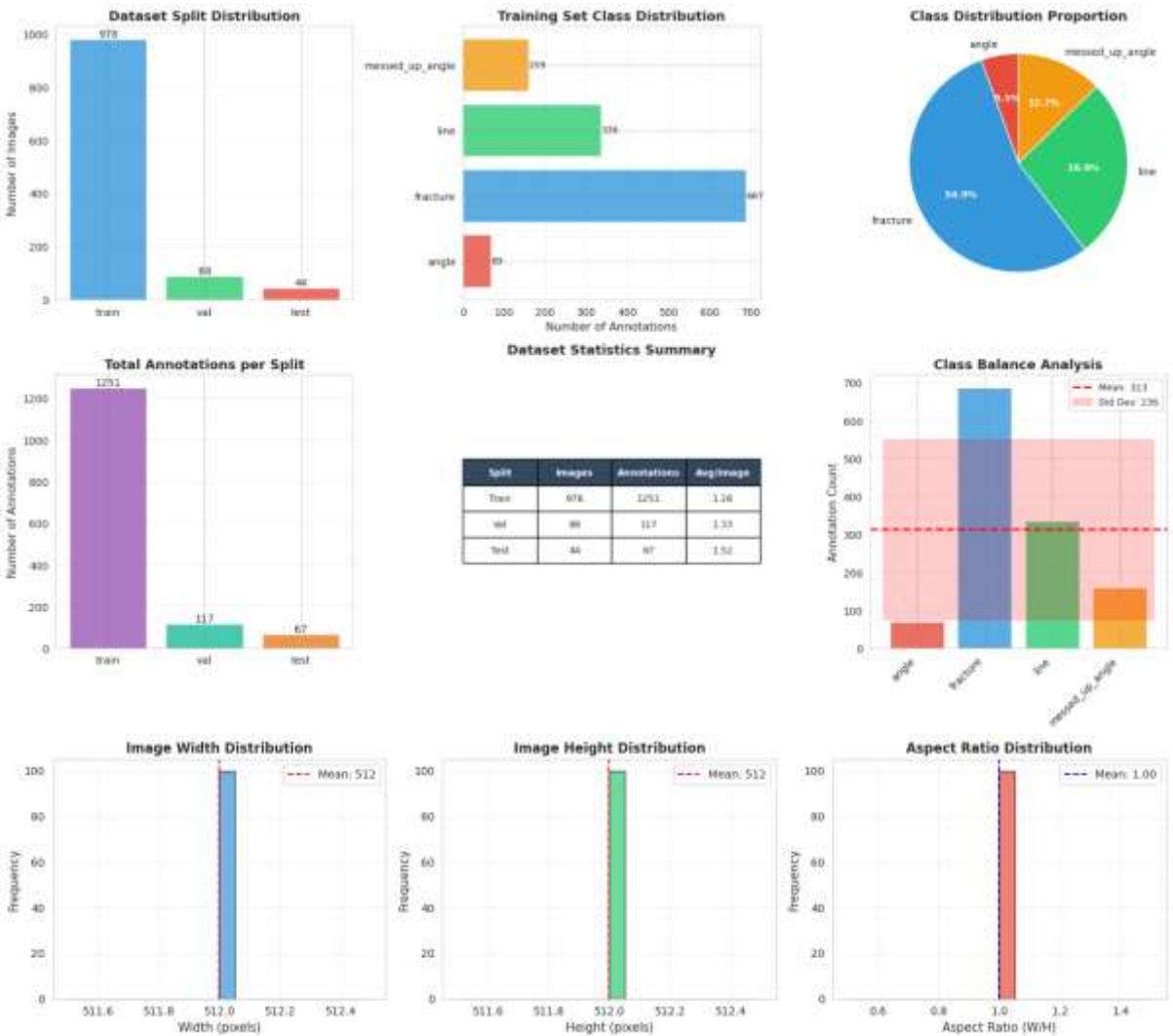
Split	Images	Annotations	Avg/Image
Train	8825	9492	1.08
val	832	888	1.07
test	427	454	1.06



```

1 # Dataset configuration
2 data_yaml = 'content/test-a-ray/images-1/data.yaml'
3
4 # Training hyperparameters
5 epochs = 100
6 batch_size = 64
7 img_size = 640
8 patience = 20 # Early stopping patience
9 device = 0 if torch.cuda.is_available() else 'cpu'
10
11 print(f"Training Configuration:")
12 print(f"Model: YOLOv12m (Medium variant)")
13 print(f"Epochs: {epochs}")
14 print(f"Batch Size: {batch_size}")
15 print(f"Image Size: {img_size}")
16 print(f"Device: {'GPU' if device == 0 else 'CPU'}")
17 print(f"Early Stopping Patience: {patience} epochs")
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YOLO 10 Data Set -4



```
4 # Dataset configuration
5 data_root = '/content/data-fracture-1/data_yml'
6
7 # Training Hyperparameters
8 epochs = 100
9 batch_size = 64
10 img_size = 640
11 patience = 20 # Early stopping patience
12 device = 0 if torch.cuda.is_available() else 'cpu'
13
14 print("\nTraining Configuration:")
15 print(f"Model: YOLOv10m (Medium variant)")
16 print(f"Epochs: {epochs}")
17 print(f"Batch Size: {batch_size}")
18 print(f"Image Size: {img_size}")
19 print(f"Device: {device} (GPU if device = 0 else 'CPU')")
20 print(f"Early Stopping Patience: {patience} epochs")
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