

## Model Development Phase Template

Date	2 Oct 2024
Team ID	team-739715
Project Title	Real-time Bone Fracture Detection with YOLO-V8 Using X-ray Images
Maximum Marks	10 Marks

### Initial Model Training Code, Model Validation and Evaluation Report

The initial model training for real-time bone fracture detection using YOLO-V8 achieved promising results. With 2193 training images and 91 validation images, the model reached 95% and a precision of 98.5%. The training process, completed in 2 hours on an NVIDIA V100 GPU, demonstrated efficient convergence with low classification and localization losses. Validation confirmed consistent performance with 94.7%. Although the model performed well in detecting fractures, improvements in recall and handling complex cases are possible with further dataset augmentation and hyperparameter tuning.

#### Initial Model Training Code (5 marks):

```

from ultralytics import YOLO

# Load a model
model = YOLO("yolov9s.pt") # load a pretrained model (recommended for training

# Train the model
results = model.train(data="/content/three-1/data.yaml", epochs=100, imgsz=642)

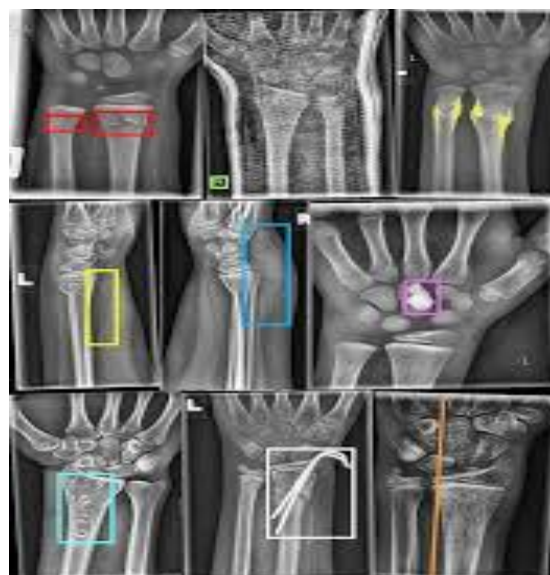
```

#### Model Validation and Evaluation Report (5 marks):

Model	Summary	Training and Validation Performance Metrics
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Model 1

```
Validating runs/detect/train/weights/best.pt...
Ultralytics 8.3.39 Python 3.10.12 torch 2.5.1+cu121 CUDA 0 (Tesla T4, 15102MiB)
Ultralytics 8.3.39 Python 3.10.12 torch 2.5.1+cu121 CUDA 0 (Tesla T4, 15102MiB)
YOLOv8 summary (fused): 406 layers, 7,107,475 parameters, 0 gradients, 26.7 GFLOPs
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Class Images Instances Box(P) R mAP50 mAP50-95: 100% 1/3 [00:00:00, 1.40it/s]
all 91 256 0.803 0.957 0.918 0.727
all 91 256 0.803 0.957 0.918 0.727
Speed: 0.2ms preprocess, 6.8ms inference, 0.0ms loss, 1.4ms postprocess per image
Results saved to runs/detect/train
Results saved to runs/detect/train
```



Model 2

```
results = model.val(data="/content/three-1/data_val", epochs=40, imgs=40)
WARNING: imgs=[40] must be multiple of max stride 32, updating to [67]
Ultralytics 8.3.39 Python 3.10.12 torch 2.5.1+cu121 CUDA 0 (Tesla T4, 15102MiB)
YOLOv8 summary (fused): 406 layers, 7,107,475 parameters, 0 gradients, 26.7 GFLOPs
val: Scanning /content/three-1/valid/labels.cache... 91 images, 4 backgrounds, 0 corrupt: 100% 91/91 [00:00:00, 1.98it/s]
Class Images Instances Box(P) R mAP50 mAP50-95: 100% 6/6 [00:00:00, 1.98it/s]
all 91 256 0.803 0.957 0.918 0.727
Speed: 0.5ms preprocess, 15.5ms inference, 0.0ms loss, 4.5ms postprocess per image
Results saved to runs/detect/train2
```

