Model Optimization and Tuning Phase Template

Date	8 Sep 2024
Team ID	739704
Project Title	Railway Sentry: Detecting Workers on Railway Tracks using YOLO V9
Maximum Marks	10 Marks

Model Optimization and Tuning Phase

The Model Optimization and Tuning Phase involves refining neural network models for peak performance. It includes optimized model code, fine-tuning hyperparameters, comparing performance metrics, and justifying the final model selection for enhanced predictive accuracy and efficiency.

Hyperparameter Tuning Documentation (8 Marks):

Model	Tuned Hyperparameters
YOLOv9s	

```
#resize images
resized_images = [cv2.resize(img, (640, 640)) for img in images]

# Display a resized image as a sample
plt.imshow(cv2.cvtColor(resized_images[0], cv2.COLOR_BGR2RGB))
plt.axis('off')
plt.show()
```

YOLOv9s	```#normalisation
	normalized_images = [img / 255.0 for img in resized_images]
	
	# Display a normalized image as a sample
	plt.imshow(normalized_images[0])
	plt.axis('off')
	plt.show()```

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
YOLOv9s	In the quest for optimal real-time object detection, YOLOv9 stands out with its innovative approach to overcoming information loss challenges inherent in deep neural network. By integrating PGI and the versatile GELAN architecture, YOLOv9 not only enhances the model's learning capacity but also ensures the retention of crucial information throughout the detection process, thereby achieving exceptional accuracy and performance.