

## Model Optimization and Tuning Phase Template

Date	15 November 2024
Team ID	739653
Project Title	Fireguardian yolov8 Empowered wildfire smoke surveillance
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
YOLOv8n	<pre>!yolo task=detect mode=train model=yolov8n.pt data=/content/Wildfire-Smoke-1/data.yaml epochs=51 imgsz=256  Transferred 319/355 items from pretrained weights TensorBoard: Start with 'tensorboard --logdir runs/detect/train4', view at http://localhost:6006/ Freezing layer 'model.22.dfl.conv.weight' AMP: running Automatic Mixed Precision (AMP) checks with YOLOv8n... WARNING ⚠ NMS time limit 0.550s exceeded AMP: checks passed ✓ train: Scanning /content/Wildfire-Smoke-1/train/labels... 516 images, 0 backgrounds, 0 corrupt, 100% 516/516 [00:00&lt;00:00 7177.0</pre>

**Final Model Selection Justification (2 Marks):**

Final Model	Reasoning
YOLOv8n	<p>The FireGuardian system integrates advanced YOLOv8 AI with satellite imagery, drones, and ground-based sensors for precise and real-time wildfire smoke detection. This innovative solution addresses critical challenges in wildfire management, enabling early detection, accurate localization, and actionable insights.</p> <p>Key features include smoke and heat anomaly detection, geotagging, smoke density analysis, and temporal trend monitoring. The system's multi-source data aggregation ensures comprehensive situational awareness, while language and response efficiency features support global adaptability and rapid emergency response.</p>

