Smartan.AI - Computer Vision & AI Internship Task

Task: Object Detection with YOLO-based Fine-Tuning

Duration: 2 Days

Submission Deadline: 25th June (Mid night)

Overview:

This task is designed to assess your ability to fine-tune a state-of-the-art object detection model (YOLOv5 or YOLOv8 or model of your choice) on a custom dataset. You will identify and train the model on three novel object classes that are not recognized by default. The task tests your data collection, annotation, model training, and deployment skills in a practical real-time computer vision scenario. Your goal is to show successful object detection in live webcam feed after fine-tuning the model.

Objective:

Train or fine-tune a YOLO model to detect custom objects from live webcam feed.

Problem Description:

- Choose 3 object classes that are not detected by default in YOLOv5/YOLOv8 (e.g., a specific water bottle, gym gloves, resistance band, etc.).
- Collect your own data:
  - Capture at least 20–30 images per class under varied lighting and angles.
  - Use annotation tools like LabelImg or Roboflow to label the dataset in YOLO format.

Step 1: Demonstrate that the pre-trained YOLO model fails to detect these classes in a live webcam feed.

Step 2: Fine-tune the YOLO model on your custom dataset.

Step 3: Run the updated model on webcam input to show successful detection of the three new classes.

Requirements:

- Use YOLOv5 or YOLOv8 or any other model of your choice (PyTorch implementation).
- Prepare your dataset in YOLO-compatible format.
- Train on GPU (use Google Colab if necessary).
- Implement a simple webcam inference demo showing your fine-tuned model in action.

Submission Must Include:

- YOLO-formatted annotated dataset (image files and label .txt files).
- A public GitHub repository containing:
  - Training script or notebook
  - Inference script (webcam detection demo)

  - README with clear explanation of:
  - Object class selection
  - Data collection and annotation process
  - Model training and tuning
  - Limitations and challenges
- A sample video or screen recording of live webcam demo showing detection of the custom classes.

Submissions Will Be Rejected If:

- GitHub repository is private or incomplete.
- Required components (code, demo video, documentation) are missing.
- Submission is plagiarized or copied from online sources.
- Submission is delayed without prior approval.

Bonus Points (Optional):

- Streamlit/Flask GUI for real-time object detection
- Effective use of data augmentation
- Use of self-supervised or semi-supervised methods

If you have questions, feel free to reach out before the deadline.

-- Team Smartan.AI