Weekly Progress Report

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Data science and Machine Learning

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Week Ending: 01

I. Overview:

- During the first week of the project, the primary focus was understanding the agricultural field problem of identifying weeds in crop areas using Artificial Intelligence.
  Initial work included dataset study, image preprocessing, dataset structuring, and learning YOLO model basics.
- The aim is to build a system that detects weeds separately from crops to enable precise pesticide spraying.

II. Achievements:

1. **Project Understanding & Problem Study**

   - Studied the concept of **smart farming** & role of computer vision.
   - Understood **impact of weeds** on crop growth and productivity.
   - Analyzed **why YOLO** is best for object detection in real-time.

2. **Dataset Collection & Organization**

   - Acquired **1300 labeled images** containing crops & weeds.
   - Images were in **512×512** resolution suitable for YOLO training.
   - Dataset included **bounding box annotations** in YOLO format.

3. **Data Cleaning & Verification**

   - Removed images with poor lighting, blur, or incorrect labels.
   - Ensured **dataset_split** folders exist:
     - train/
     - val/
     - test/
   - Checked label consistency for both categories:
     - **Class 0 → Crop**
     - **Class 1 → Weed**

4. **Environment Setup**

- Setup Google Colab environment
- Installed dependencies:
  - PyTorch
  - ultralytics (YOLOv8)
  - OpenCV
- Mounted Google Drive for project storage

III. Challenges:

1. **Dataset extracted with mixed files**

   - Solution: Manually separated images & labels into correct folders

2. **Some images had incorrect bounding boxes**

   - Solution: Verified and fixed annotation errors.

IV. Learning Resources:

1. **YOLOv8 Training and Interferance:** Ultralytics official documentation
2. **Object Detection Concepts:** Online tutorials & YouTube learning
3. **Roboflow labeling format:** Roboflow docs
4. **Google Colab GPU environment:** Online course resources

V. Next Week's Goals:

- Begin training YOLOv8 model for weed detection
- Monitor metrics like Precision, Recall & mAP
- Perform inferencing on test dataset
- Save and analyze predicted outputs
- Start drafting result analysis

VI. Additional Comments:

This week provided strong understanding of agricultural image processing and deep learning-based detection.

I gained valuable experience working with a **real-world dataset**, overcoming data structure errors, and preparing the environment for next week's model training phase

VII. GitHub:

Here you will be able to access all the data about this project