

A Deep Learning Pipeline for Robust Wheat Counting in Multi-Object Field Scenes

Team: ISOMETRIC ([Github Link](#))

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WEEKLY REPORT 2

A. Progress Completed

1. **Problem Understanding:** The project objective was clarified as a single-class object detection task aimed at detecting and localizing wheat heads in field images using bounding box annotations.
2. **Dataset Structure and Annotation Review:** The dataset organization and annotation format were examined. Each wheat head is labeled using bounding box coordinates. Initial inspection of sample images indicated multiple objects per image, dense regions, and lighting variation.
3. **Literature Review:** The following research works on deep learning-based crop and object detection were reviewed:
“Deep Learning-Based Wheat Head Detection Using UAV Imagery”
<https://www.mdpi.com/2072-4292/14/20/5141>
“Automatic Wheat Spike Detection Using Convolutional Neural Networks”
<https://www.mdpi.com/2073-4395/13/5/1309>
“Deep Learning for Plant Phenotyping and Yield Estimation: A Review”
<https://www.frontiersin.org/journals/plant-science/articles/10.3389/fpls.2022.1004427/full>
4. **Technical Challenges:** Small object detection and overlapping wheat heads.

B. Upcoming Work (Week 3 Plan)

- Data cleaning and validation
- Exploratory Data Analysis (EDA)
- Data preprocessing
- Implementation of preprocessing pipeline