Ahmedabad University

CSE623 Machine Learning

Weekly Report 2

Feature-Based Global Wheat Full Semantic Segmentation using Classical Machine Learning and Contour Analysis

Submitted to faculty: Prof. Mehul Raval

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Student Details

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Aim:

To perform an in-depth structural analysis of the dataset and perform a comprehensive literature review.

Introduction:

Wheat phenotyping is necessary for increasing grain yield and improving crop management. Building on our initial environment setup, this week focused on simply understanding our data and the existing research landscape. As a reminder, our approach utilizes Classical Machine Learning for pixel-level classification and segmentation of wheat components. By avoiding black-box Deep Learning in favor of hand-crafted feature extraction and contour fitting, we aim to ensure clarity in the model's decision-making process.

Work Completed:

- Completed the study of the in-depth structural analysis of the Global Wheat Dataset.

- Successfully understood the dataset's metadata structure and the clear annotations required for semantic segmentation.

- Executed a detailed study of the provided references to identify different challenges in the domain.

- Analyzed existing methodologies from the mentioned references, such as multi-feature machine learning models used for automatic segmentation of vegetation cover.

Next steps and goals:

- Conduct additional literature review to analyze how existing studies overcame semantic segmentation challenges.

- Perform Exploratory Data Analysis (EDA) on the dataset to understand the data distribution, image characteristics, and annotation quality.

Conclusion:

We have formed a detailed understanding of the dataset's structural components and metadata. Also successfully completing the initial literature review phase. The next phase will concentrate on deepening our literature review to solve domain-specific challenges and conducting a comprehensive EDA to guide our feature extraction strategy.

References:

1. David et al. (2020): Global Wheat Head Dataset: A Large and Diverse Dataset of High-Resolution RGB-Images to Develop and Benchmark Wheat Head Detection Methods

   https://www.sciencedirect.com/science/article/pii/S2643651524000359?via%3Dihub

2. Kass, M., et al. (1988): Snakes: Active contour models. (Standard for geometric boundary refinement)

   https://link.springer.com/article/10.1007/bf00133570