Trello Board and Timeline for Hybrid Feature Extraction & Deep Learning for Maize Disease Detection

1 Trello Board Structure

1.1 Board Name

Hybrid Feature Extraction & Deep Learning for Maize Disease Detection

1.2 Lists and Tasks

1 To-Do (Backlog)

- Finalize the research scope and objectives
- Gather related research papers and literature
- Identify suitable datasets (Kaggle, UCI, etc.)
- Choose the evaluation metrics (Accuracy, F1-score, etc.)
- Define the experimental setup

2 Literature Review

- Review existing feature extraction methods for plant disease detection
- Summarize previous works on LBP, HOG, and Zernike Moments in plant disease detection
- Review deep learning techniques (CNN, VAE) in agricultural image analysis
- Compare classical and deep learning-based feature extraction techniques

3 Dataset & Preprocessing

- Collect maize plant disease images from public datasets
- Perform image resizing and normalization
- Apply data augmentation techniques (flipping, rotation, etc.)
- Split data into training, validation, and test sets

4 Feature Extraction & Model Development

- Implement Zernike Moments for shape-based feature extraction
- Apply LBP and HOG for texture-based feature extraction
- Implement Variational AutoEncoder (VAE) for learned feature extraction
- Develop CNN-based deep learning model
- Combine classical features with deep learning features
- Optimize hyperparameters for better model performance

5 Experiments & Evaluation

Train the hybrid model on maize disease dataset

Compare performance of traditional vs deep learning-based approaches

Evaluate accuracy, precision, recall, and F1-score

Analyze confusion matrix results

Conduct ablation studies to see the impact of different feature sets

6 Paper Writing & Documentation

Write the Introduction (problem statement, objectives)

Complete Related Work section

Document Methodology (feature extraction, model development)

Write Experimentation & Results section

Add Discussions (findings, challenges, insights)

Complete Conclusion & Future Work section

Format references and citations

7 Review & Submission

Proofread and finalize manuscript

Check journal formatting guidelines

Submit to journal (e.g., *Computers and Electronics in Agriculture*, *Sensors*)

Address reviewer comments (if applicable)

2 Project Timeline (Gantt Chart)