Project

Pollen's Profiling: Automated Classification of Pollen Grains

Team ID: LTVIP2025TMID45234

Team Size: 4

Team Leader: Narayana Sathvika

Team Member: Faridha Dudekula

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Phase 1: Brainstorming and Ideation

Objective: To automate the classification of pollen grains using deep learning and image processing.

Key Points:

- Problem Statement: Manual classification of pollen is time-consuming and prone to errors.
- Proposed Solution: A deep learning model for identifying and categorizing pollen grains based on morphological features.
- Target Users: Environmental scientists, allergists, agricultural researchers.
- Expected Outcome: A web-based application for pollen classification to support environmental, medical, and agricultural domains.

Phase 2: Requirement Analysis

Objective: To gather all technical and functional requirements for pollen grain classification system.

Key Points:

- Technical Requirements:
  - o Python 3.9 or 3.10

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o TensorFlow >= 2.10

o Flask

o OpenCV, NumPy, Pandas, Matplotlib

- Functional Requirements:

o User uploads pollen image

o System processes and classifies image

o Displays prediction on web interface

- Constraints:

o Dataset quality impacts performance

o Hardware limitations during training

Phase 3: Project Design

Objective: To design a scalable architecture for the application.

System Architecture:

User Interface -> Flask Backend -> CNN Model -> Classification Output

User Flow:

- User selects an image

- Model analyzes image via Flask

- Results are shown on the frontend

Phase 4: Project Planning

Sprint Task Priority Duration Deadline Assigned to Dependencies Expected outcome

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Sprint 1

Environment Setup & Package Installation High 3 hrs Day 1 Member 1 Python, Anaconda Ready environment

Dataset Collection & Preprocessing High 4 hrs Day 1 Member 2 Dataset Clean dataset

Sprint 2

Model Building (CNN) High 5 hrs Day 2 Member 3 Preprocessed data Trained model

Flask Integration Medium 3 hrs Day 2 Member 1 & 4 Model, Flask Working UI

Sprint 3

Testing & Debugging Medium 2 hrs Day 2 Member 2 & 3 Complete system Bug-free system

Final Presentation & Deployment Low 1 hr End of Day 2 Entire Team Full deployment

Phase 5: Project Development

Objective: To iteratively build, test, and improve the pollen classification system.

Technology Stack:

- Language: Python

- Frameworks: TensorFlow, Flask

- Tools: Google Colab, Anaconda, Jupyter Notebook, VS Code

Development Process:

1. Data Collection

2. Data Preprocessing: resize, normalize, split

3. Model Building: CNN with convolutional, pooling, and dense layers

4. Model Training: use ImageDataGenerator

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5. Evaluation: assess model performance

6. Web Integration: Flask

7. Deployment and Testing

Challenges:

- Environment setup issues resolved using correct versions

- TensorFlow install problems resolved using clean environment