Project Report Format

1. INTRODUCTION

1.1 Project Overview

Pollens Profiling: Automated Classification of Pollen Grains is a machine learning-based project designed to classify various pollen grain types using microscopic images. It aims to reduce the manual workload of researchers and provide faster, more accurate identification of pollen species.

1.2 Purpose

The purpose of this project is to automate the classification of pollen grains using image recognition techniques and a trained deep learning model (CNN), reducing dependency on manual microscopy and increasing research efficiency.

2. IDEATION PHASE

2.1 Problem Statement

Manual pollen classification is time-consuming, requires domain expertise, and is error-prone. This hinders the speed and reliability of environmental studies and allergy forecasting.

2.2 Empathy Map Canvas

Says: "Manual classification takes too long.”
Thinks: "What if I make an error?"
Does: Observes under microscope, compares manually.
Feels: Frustrated, curious about automation.

2.3 Brainstorming

Use of CNNs for image classification.
Clean UI for image upload and result display.
Deployment via Flask on web interface.
Model training using high-resolution pollen dataset.

3. REQUIREMENT ANALYSIS

3.1 Customer Journey map

Collect sample → Capture Image → Upload → View Prediction → Use Result

3.2 Solution Requirement

Functional: Image upload, classification, history tracking
Non-Functional: Accuracy, performance, usability, scalability

3.3 Data Flow Diagram

User Upload → Server → CNN Model → Output (Class, Confidence) → Display on UI

3.4 Technology Stack

Frontend: HTML, CSS, JS
Backend: Python, Flask
ML: TensorFlow / Keras
Database: SQLite / MySQL
Deployment: Localhost or Cloud

4. PROJECT DESIGN

4.1 Problem Solution Fit

The system directly addresses pain points in manual classification by offering AI-driven, automated identification.

4.2 Proposed Solution

Users upload pollen images, the CNN model classifies them, and outputs results with confidence scores. Data is stored for tracking and analysis.

4.3 Solution Architecture

Client (UI) → Flask Server → CNN Model → Database → Output to User

5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

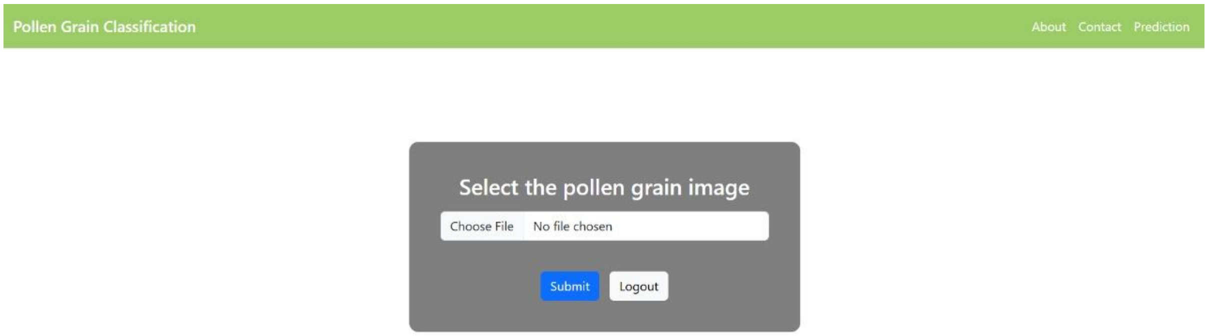
Sprint-based agile planning over 2 weeks with defined user stories, tasks, and roles.

6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

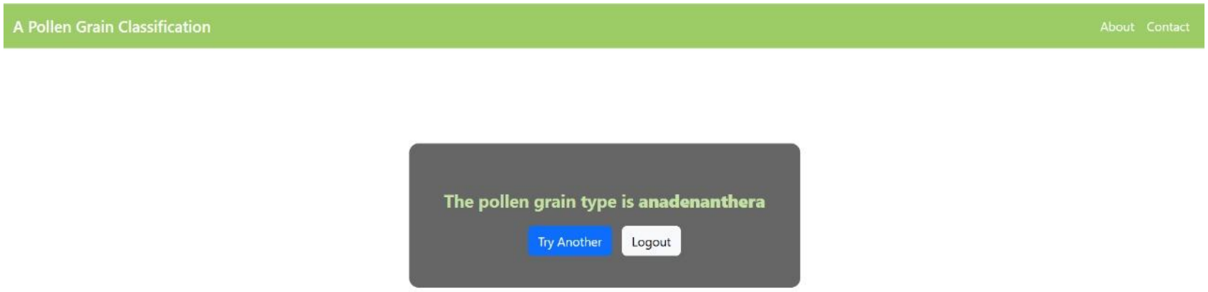
Tested model accuracy using validation dataset. Evaluated server response time and prediction latency.

7. RESULTS



Select the pollen grain image

No file chosen



The pollen grain type is **anadenanthera**

8. ADVANTAGES & DISADVANTAGES

Advantages: Fast, accurate, consistent, user-friendly
Disadvantages: Limited to trained classes, requires quality input images

9. CONCLUSION

The project successfully automates pollen classification and provides a scalable, efficient alternative to manual methods.

10. FUTURE SCOPE

Expand model to classify more pollen species

Mobile app integration

Real-time data sharing with health/environmental agencies

11. APPENDIX

Dataset Link:

https://www.kaggle.com/datasets/andrewmvd/pollen-grain-image-classification?form=MG0AV3

GitHub & Project Demo Link:

https://github.com/BhanuPallela/pollen-s-profiling-automated-classification-of-pollen-grains
https://drive.google.com/file/d/1F5VWzo-tuYAcsaVa5hXHp33JKu52gQYA/view?usp=drivesdk