**Project Design Phase**

**Problem – Solution Fit Template**

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| Date | 26 June 2025 |
| Team ID | LTVIP2025TMID35597 |
| Project Name | Pollen's Profiling: Automated Classification of Pollen Grains |
| Maximum Marks | 2 Marks |

**Problem – Solution Fit Template:**

Pollen grains, though microscopic, are essential indicators in plant reproduction, environmental research, allergy diagnostics, and agricultural studies. Traditionally, identifying and classifying pollen under a microscope is a slow, tedious, and expertise-driven process, often prone to human error and inconsistency. This manual workflow limits scalability, especially when handling large datasets across biodiversity monitoring, crop studies, or patient allergy diagnostics

**Purpose:**

✅ To automate the classification of pollen grains using deep learning (CNN) and image processing.

✅ To reduce the time, effort, and expertise required for manual microscopic pollen identification.

✅ To improve the accuracy, consistency, and scalability of pollen analysis.

✅ To support various fields like environmental monitoring, allergy diagnosis, and agricultural research.

✅ To provide a user-friendly, accessible solution for researchers and professionals with minimal technical knowledge

**Template:** Calendar

Description automatically generated

Environmental scientists and ecologists

1. Medical professionals (allergists, clinicians)
2. Agricultural researchers and botanists
3. Lab technicians and biology students

Assist in real-time or field-based pollen recognition

Need for rapid allergy diagnosis due to rising patient load

Lack of access to AI/ML tools or technical expertise

 Budget restrictions in labs or academic research

Traditional image matching or morphology-based software tools

Currently spend hours visually inspecting and classifying pollen manually

 Maintain handwritten or spreadsheet-based logs of sample observations

 Refer to pollen morphology keys or textbooks

 Hesitant but curious about AI-powered alternatives

Use research portals datasets (e.g., Kaggle, Google Scholar)

 Browse YouTube/Google for automation in lab techniques

 Participate in webinars/conferences on AI in biology

Work in university oresearch lab settings

 Attend workshops, field studies, lab-based experiments

 Present findings in journals or academic reports

Manual classification is the legacy method with no affordable automation

**Pollen’s Profiling** provides an automated AI-based system using CNN (MobileNet) for the fast, accurate classification of pollen images. It uses deep learning, image augmentation, and a user-friendly interface (via Flask) to ensure easy use by non-technical users. This reduces time, improves consistency, and makes large-scale pollen identification accessible to everyone.

Seasonal research cycles requiring mass pollen analysis

Overwhelmed,frustrated by manual work, slow progress, fear of misclassification