SMART BRIDGE INTERNSHIP

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

**Project Title** :

Pollen profiling : automated classification of pollen grains

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Team members:

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Phase : 1 -  Brainstorming & Ideation

Objective:

Generate and refine the core idea of automating pollen classification using AI and image processing.

Key Points:

\* Problem identified: Manual pollen identification is slow, error-prone, and expert-dependent.

\* Innovation: Use of deep learning and image analysis for accurate, fast, and automated classification.

\* Domains impacted: Environmental science, healthcare (allergies), agriculture.

Phase : 2 - Requirement Analysis

Objective:

Identify user needs, functional requirements, and technical constraints.

Key Points:

Users: Environmental researchers, allergists, agronomists.

 Data requirements: High-resolution pollen images, labelled datasets.

Outputs: Classified pollen types, allergen risk levels, biodiversity stats.

Integration needs: Dashboard for visualization and reports.

 Phase : 3 - Project Design

Objective:

Design system architecture, workflow, and user interface.

Key Points:

 System components: Image preprocessing, CNN-based classifier, result interpretation module.

User Interface: Dashboard with real-time visualization and alerts.

Scalability: Modular design for future domain-specific expansion.

Phase : 4 - Project Planning (Agile Methodologies)

Objective:

Break development into iterative sprints for continuous delivery and feedback.

Key Points:

 Sprint 1: Data collection & preprocessing

 Sprint 2: Model training and tuning

 Sprint 3: Frontend & dashboard development

 Sprint 4: Integration and domain testing

Feedback loops with domain experts after each sprint

Phase : 5 - Project Development

Objective:

Build and implement the AI-powered classification system.

Key Points:

Tech stack: Python, TensorFlow/PyTorch, OpenCV, Flask/Django for backend, React/Angular for frontend

Model: Deep learning classifier trained on morphological pollen features

Functionality: Upload image → Analyse → Classify → Display result

 Phase : 6 -  Functional & Performance Testing

Objective: Validate accuracy, reliability, and performance under different scenarios.

Key Points:

Functional tests: Verify pollen classification, result accuracy, and report generation.

Performance tests: Assess response time, model efficiency, and image processing speed.

Domain validation: Real-world testing with environmental, clinical, and crop samples.