Ideation Phase
Define the Problem Statements

Date	21 June 2025
Team ID	LTVIP2025TMID59524
Project Name	Pollen's Profiling: Automated Classification of Pollen Grains
Maximum Marks	2 Marks

Pollen Grains – Problem Statement Template

Statement	Content
I am (Customer)	**A farmer, produce seller, or supply chain worker dealing with large volumes of fruits and vegetables.**
I'm trying to	**Deliver only fresh and high-quality produce to customers by removing rotten items.**
But	**Manual inspection is inefficient, inconsistent, and often inaccurate.**
Because	**It's difficult to spot rot visually—especially when it's internal or when sorting is done quickly or in bulk.**
Which makes me feel	**Frustrated by the unreliability of manual sorting, worried about customer complaints, and stressed about food waste and profit loss.**

PS-1 (Farmer/Seller View)

Element	Content
I am	A palynologist or lab technician working with pollen samples.
I'm trying to	Accurately identify and classify pollen grains under a microscope.
But	Manual classification is time-consuming, tedious, and requires expert-level knowledge.

Element	Content
Because	Pollen grains from different species often look very similar and need close morphological comparison.
Which makes me feel	Frustrated with the slow process and worried about human error affecting research accuracy.

PS-2 (Tech Developer/Team View)

Element	Content
I am	A developer or data scientist working on automating scientific image classification.
I'm trying to	Build a robust, high-accuracy model to automatically classify pollen grains.
But	The visual differences between pollen types are subtle and hard to model.
Because	Pollen grains have high inter-class similarity, limited labeled datasets, and require fine-grained feature detection.
Which makes me feel	Challenged but motivated to push the boundaries of AI in biological microscopy.

Project Title: Pollen's Profiling: Automated Classification of Pollen Grains

Pollen's Profiling: Automated Classification of Pollen Grains" is an innovative project aimed at automating the classification of pollen grains using advanced image processing and machine learning techniques. By leveraging deep learning algorithms and image analysis methods, this project seeks to develop a system capable of accurately identifying and categorizing pollen grains based on their morphological features.

Problem Statement:
Identifying and classifying pollen grains manually under a microscope is time-consuming, labor-intensive, and requires expert-level knowledge. Variability in pollen grain shapes, textures, and sizes across species makes visual classification error-prone and inconsistent,

especially when done at scale. This creates a bottleneck in fields like palynology, environmental science, and allergy forecasting.

Proposed Solution:

To develop an automated system using image processing and machine learning techniques that can accurately classify different types of pollen grains based on microscopic images, thereby increasing speed, accuracy, and consistency in pollen analysis.

Target Outcome:

- High intra-class variability and inter-class similarity among pollen grain images.
- Limited annotated datasets with sufficient diversity.
- Need for precise feature extraction from complex microstructures.
- Balancing model accuracy with inference speed for practical deployment.