FSD Documentation (Functional Specification Document)

1. Introduction

This document outlines the functional specifications of the "Pollen’s Profiling" system aimed at automating pollen grain classification using machine learning techniques.

2. Purpose

To provide researchers and professionals an intelligent system that can classify pollen types accurately, aiding environmental, medical, and agricultural fields.

3. System Overview

- **Input**: Microscopic images of pollen grains.
- **Output**: Classified pollen type with prediction confidence.
- **Interface**: Web-based frontend with image upload and result visualization.

4. Functional Components

- **Image Upload Module**: Accepts image files in standard formats (JPG, PNG).
- **Preprocessing Engine**: Enhances image features for better classification.
- **Classification Engine**: Uses trained CNN model to predict the pollen class.
- **Results Display**: Shows prediction with confidence scores.
- **Logging System**: Records results in a database or exportable file.

5. Assumptions

- The user provides good-quality, centered images of individual pollen grains.
- Model is pre-trained and optimized prior to deployment.

6. Dependencies

- Python libraries (OpenCV, TensorFlow, NumPy)
- Backend framework (Flask or Streamlit)
- Optional: SQLite or Firebase for result storage