# Project Phases Template

Project Title: 𝐆𝐫𝐚𝐢𝐧𝐏𝐚𝐥𝐞𝐭𝐭𝐞 – 𝘼 𝘿𝙚𝙚𝙥 𝙇𝙚𝙖𝙧𝙣𝙞𝙣𝙜 𝙊𝙙𝙮𝙨𝙨𝙚𝙮 𝙞𝙣 𝙍𝙞𝙘𝙚 𝙏𝙮𝙥𝙚 𝘾𝙡𝙖𝙨𝙨𝙞𝙛𝙞𝙘𝙖𝙩𝙞𝙤𝙣

Team Name:  
  
Leave Space here...

Team Members:  
  
N Leelakrishna

Motapotula Varalakshmi

Mohammed Habeeb Pasha

Mohammad Faizul Rehaman

# Phase 1: Brainstorming & Ideation

GrainPalette is an AI-powered rice grain classification system designed to assist farmers, agricultural scientists, and home gardeners in accurately identifying different types of rice grains through image recognition. Leveraging transfer learning with a MobileNet-based convolutional neural network, the system enables users to upload photos of rice grains and receive fast, reliable predictions of their variety. This empowers farmers to make informed decisions about cultivation practices such as irrigation and fertilization, supports researchers in efficient data collection during fieldwork, and promotes education and awareness about rice biodiversity. With plans to expand its capabilities to include batch processing, offline mobile use, and explainable AI features, GrainPalette aims to enhance agricultural productivity, sustainability, and market transparency while bridging the gap between technology and rural farming communities.

# Phase 2: Requirement Analysis

Functional Requirements:  
Image Upload,Rice Grain Classification, Display Prediction Results

Non-Functional Requirements:  
 performance,security,usability

Technical Requirements:  
Python, TensorFlow/Keras, Flask, MobileNetV2, HTML/CSS/JavaScript, and cloud or local server for deployment.

## Phase 3: Project Design

System Architecture Overview:

1. **Architecture:** Client-server model with frontend for image upload and backend for model inference.
2. **Model:** MobileNetV2 transfer learning fine-tuned for rice grain classification.
3. **Dataflow:** Image upload → preprocessing → prediction → result delivery.
4. **Interface:** Responsive UI with upload, preview, submit, and results display.
5. **Storage:** Temporary secure storage of images during processing.
6. **Security:** Data encryption in transit and secure handling of user data.
7. **Scalability:** Designed for handling multiple concurrent users and future cloud deployment.

.

# Phase 4: Project Planning

Roles and Responsibilities:  
- N Leelakrishna – ML Model Development  
- Motapotula Varalakshmi– Data Collection & Preprocessing  
- Mohammed Habeeb Pasha– Model Testing & Evaluation  
- Mohammad Faizul Rehaman – Documentation & Presentation  
  
Timeline:  
- Week 1–2: Ideation and Dataset Collection  
- Week 3: Preprocessing & Model Selection  
- Week 4: Model Training and Evaluation  
- Week 5: UI Integration and Testing  
- Week 6: Documentation and Presentation Prep

# Phase 5: Project Development

Steps Involved:  
**Project Development Steps**

1. **Requirement Analysis:** Identify functional and non-functional needs for the system.
2. **Dataset Collection:** Gather and preprocess rice grain images for training and testing.
3. **Model Development:** Build and train the MobileNetV2-based classification model.
4. **Backend Development:** Create Flask API for image handling and prediction.
5. **Frontend Development:** Design a user-friendly web interface for image upload and result display.
6. **Integration:** Connect frontend with backend to enable end-to-end functionality.
7. **Testing:** Perform unit, integration, and user testing to ensure reliability and accuracy.
8. **Deployment:** Host the application on a local server or cloud platform.
9. **Feedback & Improvement:** Collect user feedback and update the system as needed.

# Phase 6: Functional and Performance Testing

**Functional Testing:**

1. Image Upload
2. Prediction Accuracy
3. UI Elements
4. Error Handling
5. Feedback Submission

**Performance Testing:**

1. Response Time
2. Load Handling
3. Resource Usage
4. Inference Speed
5. System Stability

## **Sample Output:**

1. Predicted Type: **Basmati** | Confidence: **94.7%**
2. Predicted Type: **Jasmine** | Confidence: **91.2%**
3. Predicted Type: **Sona Masoori** | Confidence: **89.5%**
4. Predicted Type: **Brown Rice** | Confidence: **96.3%**
5. Predicted Type: **Arborio** | Confidence: **88.9%**

Conclusion  
GrainPalette successfully demonstrates the application of deep learning and transfer learning in agriculture by accurately classifying different rice grain types through image analysis. The project provides a practical tool for farmers, researchers, and gardeners to make informed decisions based on rice variety identification. With a user-friendly interface and reliable backend model, it bridges the gap between AI technology and real-world agricultural needs, promoting efficiency, education, and sustainability in rice cultivation.

|  |
| --- |
|  |