

# **Final Report: GrainPalette – A Deep Learning Odyssey in Rice Type Classification Through Transfer Learning**

## **1. INTRODUCTION**

### **1.1 Project Overview**

GrainPalette is a deep learning-based project that uses transfer learning to classify different types of rice grains. By leveraging MobileNetV2, a pre-trained convolutional neural network, the project achieves high accuracy with limited computational resources.

### **1.2 Purpose**

To automate rice grain classification through AI, enabling farmers, researchers, and educational platforms to benefit from efficient and reliable identification of rice types based on images

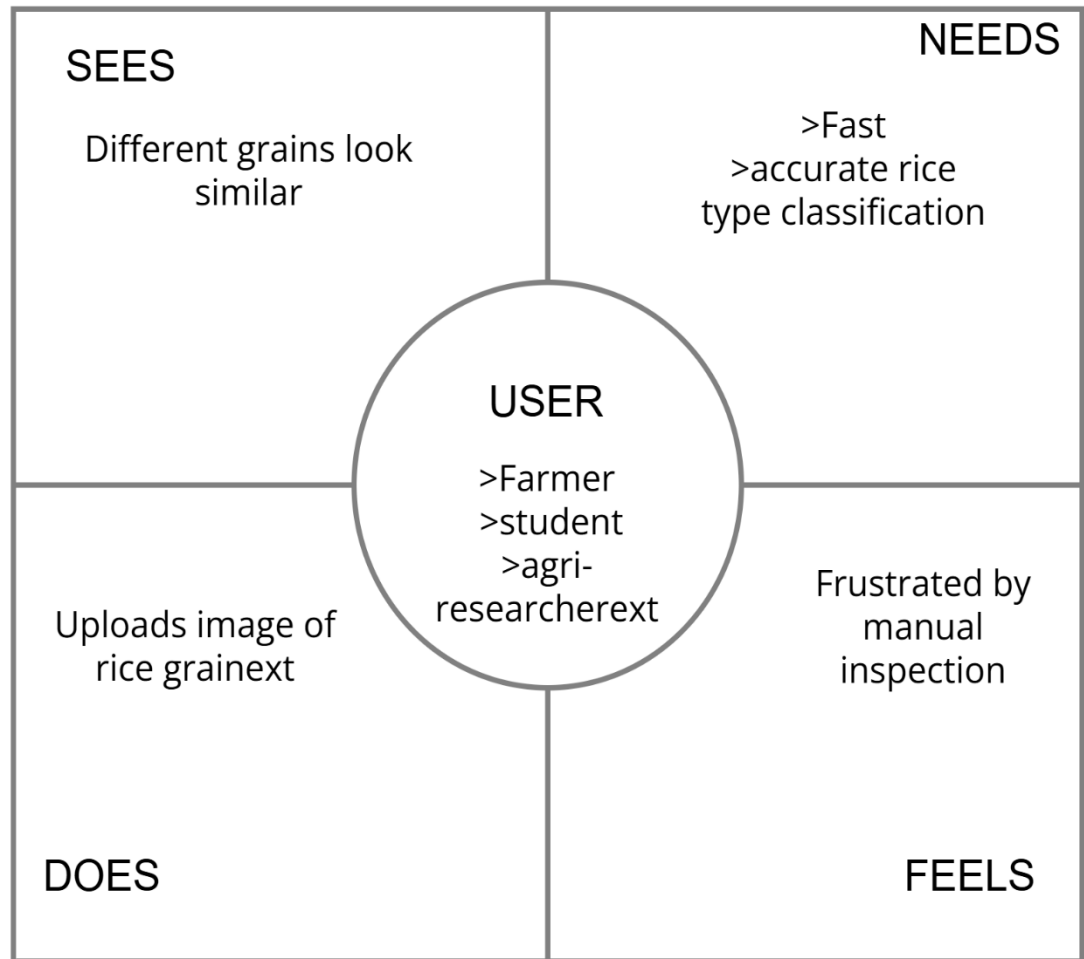
## **2. IDEATION PHASE**

### **2.1 Problem Statement**

Farmers and researchers struggle with manual identification of rice types, which is time-consuming and prone to error. There's a need for an automated, fast, and accurate solution.

### **2.2 Empathy Map Canvas**

- User: Farmer, student, agri-researcher
- Needs: Fast, accurate rice type classification
- Feels: Frustrated by manual inspection
- Sees: Different grains look similar
- Does: Uploads image of rice grain



### 2.3 Brainstorming

- Image classification
- Transfer learning
- Web interface using Flask
- Agricultural use cases
- Include recommendations (water/fertilizer)

## 3. REQUIREMENT ANALYSIS

### 3.1 Customer Journey Map

Access website → Upload rice image → View rice type & recommendations → Use for planning or learning.

### 3.2 Solution Requirements

- Accurate classification
- Lightweight model
- Simple UI
- Information output

### 3.3 Data Flow Diagram

1. Image Upload
2. Preprocessing
3. Model Prediction
4. Output Display

### 3.4 Technology Stack

- Python
- TensorFlow + Keras
- Flask
- HTML/CSS (Bootstrap)
- Jupyter Notebook
- VS Code

## **4. PROJECT DESIGN**

### 4.1 Problem-Solution Fit

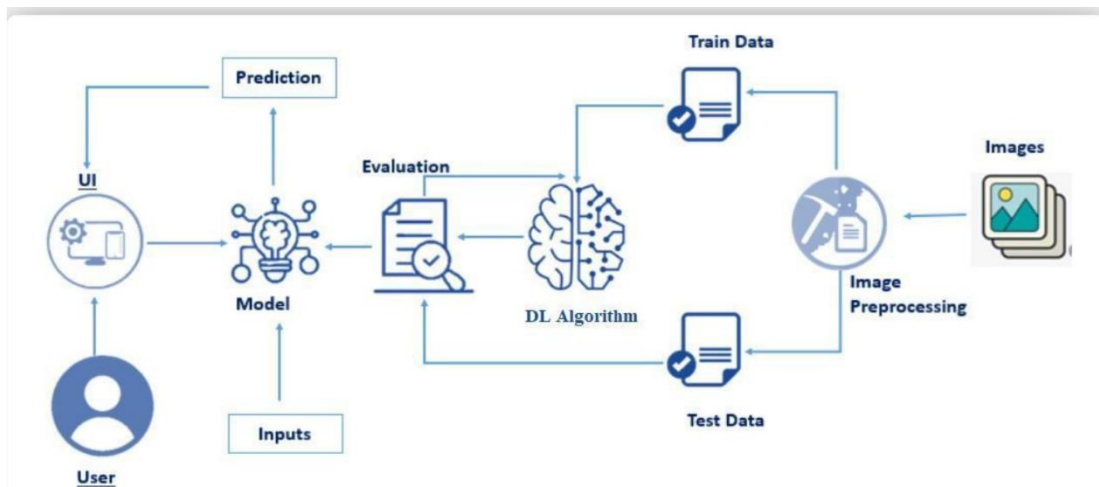
Manual identification vs. AI-based instant recognition

### 4.2 Proposed Solution

A trained MobileNetV2 model deployed with Flask backend to predict rice type and provide care recommendations.

### 4.3 Solution Architecture

1. Image → Flask App
2. Preprocess image
3. Predict using trained model
4. Return result (type + recommendations)



## 5. PROJECT PLANNING & SCHEDULING

### 5.1 Project Planning

- Problem study and dataset collection
- Model training and tuning
- Flask app development
- Frontend design & testing
- Documentation & video demo

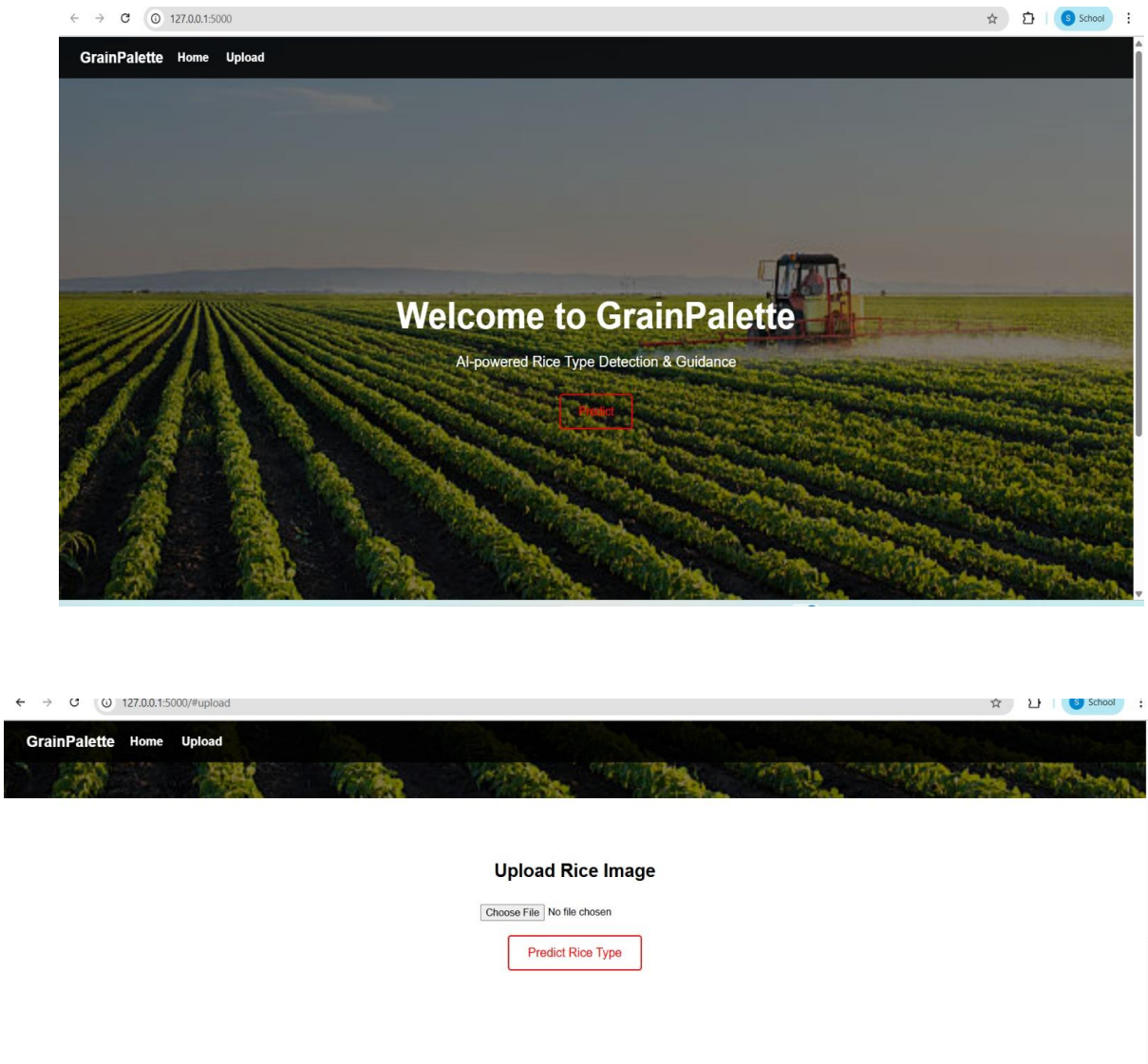
## 6. FUNCTIONAL AND PERFORMANCE TESTING

### 6.1 Performance Testing

- Tested on 1000 images per class
- Achieved average prediction accuracy: ~92%

- Response time < 2 seconds/image

## 7. RESULTS



### Prediction Result

Predicted Rice Type: Basmati



Water Requirement: Moderate to high

Fertilizer Recommendation: Balanced NPK; prefers organic fertilizers too

[Try Another](#)

## 8. ADVANTAGES & DISADVANTAGES

### Advantages

- Fast and accurate
- Lightweight (MobileNet)
- Educational and practical

### Disadvantages

- Needs clear images
- Limited to 5 rice types
- Doesn't handle damaged grains well

## 9. CONCLUSION

GrainPalette proves that transfer learning can be used effectively in agricultural domains. It simplifies the classification task and provides useful data to users in real time.

## 10. FUTURE SCOPE

- Add more rice types
- Expand to quality grading
- Mobile app integration
- Include price predictions

## 11. APPENDIX

Dataset Link: <https://www.kaggle.com/datasets/muratkokludataset/rice-image-dataset>

GitHub Link: <https://github.com/yashodalala/THE-CLASSIFIER-MODEL>

Video Demo Link:

[https://drive.google.com/file/d/1T5ZNIWdumlrJEVnXsO2SKEfHPa6\\_-89s/view?usp=sharing](https://drive.google.com/file/d/1T5ZNIWdumlrJEVnXsO2SKEfHPa6_-89s/view?usp=sharing)