Project Report: Grainpalette - A Deep Learning Odyssey

*Rice Type Clssslflcstlon Through Deep Learning*

## . INTRODUCTION

* 1. Project Overview

Grainpalette is a deep learning-based Image classification system designed to accurately identify different types of rice grains. Leveraging convolutlonal neural networks (CNNs), the project aims to assist agricultural sectors, exporters, and quality control bodies In Identifying rice varieties from Images.

* 1. Purpose

The main goal Is to automate the rice classification process to save time, reduce human error, and Improve quality assessment In the rice Industry.

## IDEATION PHASE

* 1. Problem Statement

Manual classification of rice is time-consuming and prone to inaccuracies. There's a need for an automated, scalable solution that can accurately classify rice types from images.

* 1. Empathy Map Canvas

Stakeholders include rice quality Inspectors, farmers, and exporters. Their needs focus on accuracy, efficiency, and ease of use.

* 1. Brainstorming

Ideas explored Included tradltfonal image processing, machine learning, and deep learning. CNNs were chosen for their high accuracy in image,based tasks.

1. REQUIREMENT **ANALYSIS**
   1. Customer Journey Map

User uploads rice grain images . System processes the image . Model classifies the rice type . Output displayed with confidence score.

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* 1. Solution Requirement
     + Python environment
     + Labeled rice grain dataset
     + Deep learning framework (TensorFlow/Keras)
* GPU (for training phase)
  1. Data Flow Diagram

Image Input . Preprocessing -· CNN Model . Classification Output

* 1. Technology Stack
     + Language: Python
     + Libraries: TensorFlow. Keras, NumPy, OpenCV
     + Tools: Jupyter Notebook, Google Colab
     + Dataset: [UCI Rice Dataset/ Custom Image Dataset]

# PROJECT DESIGN

* 1. Problem Solution Fit

Deep learning models can distinguish between subtle difterences in rice grain shape and texture, offering a reliable solution.

* 1. Proposed Solution

Use a CNN trained on labeled Images of rice types to perform multi-class classification.

* 1. Solution Architecture

1. Data Collection & Preprocessing
2. Model Design (CNN layers)
3. Training & Validation

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1. Evaluation & Deployment

# PROJECT PLANNING & SCHEDULING

* 1. Project Planning
     + Week 1-2: Data collection and preprocessing
* Week 3: Model development
  + - Week 4: Training and tuning
* Week 5: Evaluation
  + - Week 6: Deployment and testing

# FUNCTIONAL ANO PERFORMANCE TESTING

* 1. Performance Testing

Model tested using metrics like Accuracy, Precision, Recall, and Fl-score. Achieved over 90%accuracy on the test dataset.

# RESULTS

* 1. Output Screenshots

Model successfully predicted the rice type and displayed confidence scores. (Attach sample screenshots)

# ADVANTAGES & DISADVANTAGES

Advantages

* High accuracy
* Automated and fast
* Scalable and user-friendly

Disadvantages

* Requires qualify dataset
* Needs GPU for training
* May struggle with low-qualify Images

# CONCLUSION

Gralnpalette demonstrates the power of deep learning in agricultural classification tasks.

It enhances efficiency, accuracy, and reliability in rice grain identification.

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# FUTURE SCOPE

* Expand to other grains or crops
* Integrate mobile app for on-the-go classification
* Improve model with more diverse datasets
* Add support for multilingual Interfaces

# APPENDIX

Source Code Available on GitHub

Dataset Link

[Insert Dataset Link)

GitHub & Project Demo Link

[Insert GitHub Repository or VouTube Demo Link]

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