🌾 GrainPalette: A Deep Learning Odyssey in Rice Type Classification through Transfer Learning

# Project Title

GrainPalette – A Deep Learning Odyssey in Rice Type Classification

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# Team Leader

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# Project Overview

This project presents an AI-based rice grain classifier web app that accurately identifies different rice types using image classification powered by deep learning. The solution assists farmers, agriculture researchers, and grain quality inspectors by offering a quick and reliable way to identify grain types from images using a pre-trained MobileNetV2 model with transfer learning.

# Objective

- Classify rice grains into 5 categories: Basmati, Jasmine, Arborio, Brown, and Red rice.  
- Build a user-friendly web interface using Flask.  
- Enable users to upload an image and get a prediction in real-time.

# Technologies Used

Programming Language: Python 3.10  
Web Framework: Flask  
Deep Learning: TensorFlow, Keras  
Pre-trained Model: MobileNetV2  
Image Processing: Pillow (PIL), OpenCV  
Visualization: Matplotlib  
Frontend: HTML (index.html)  
Deployment Ready: Localhost, GitHub

# Project Structure

GrainPalette\_Rice\_Classifier/  
├── app.py # Flask backend  
├── rice\_model.h5 # Trained rice classifier model  
├── requirements.txt # Required Python packages  
├── README.md # GitHub project overview  
├── templates/  
│ └── index.html # Image upload HTML form  
├── static/  
│ └── uploads/ # Stores uploaded images temporarily

# Model Details

- Used MobileNetV2 with fine-tuning (transfer learning)  
- Input shape: 224x224  
- Number of classes: 5  
- Accuracy: [Insert your accuracy here if available]  
- Framework: TensorFlow/Keras  
- Saved model: rice\_model.h5

# Working of the Web Application

1. User opens the web interface (index.html).  
2. User uploads an image of a rice grain.  
3. The image is saved and preprocessed (resized to 224x224, normalized).  
4. Image is fed to the deep learning model.  
5. Prediction result is returned and displayed as the rice type.

# How to Run the Project Locally

Step 1: Clone the GitHub repository  
git clone https://github.com/YOUR\_USERNAME/rice-classifier  
cd rice-classifier  
  
Step 2: Install dependencies  
pip install -r requirements.txt  
  
Step 3: Run Flask app  
python app.py  
  
Step 4: Open in browser  
Visit: http://127.0.0.1:5000

# Screenshots

\*Add screenshots of your web interface, prediction results, etc.\*

# Use Cases

- Farmer advisory systems  
- Rice quality control labs  
- Agri-tech apps for mobile classification  
- Educational demos on transfer learning

# Future Enhancements

- Improve model with a larger rice dataset  
- Add more grain types (e.g., black rice, wild rice)  
- Deploy the app using Render, Replit, or Hugging Face Spaces  
- Add image drag-and-drop and history tracking

# Conclusion

This project shows how deep learning can be effectively applied to agricultural problems. By combining a pre-trained CNN model with a simple Flask web interface, we created a fully functional, real-time rice classifier that serves both research and practical field applications.

# GitHub Repository

🔗 https://github.com/YOUR\_USERNAME/rice-classifier