AI & ML Project Documentation

Introduction Project

Title:

Grainpalette - A Deep Learning Odyssey in Rice Type Classification Through Transfer Learning

Team Members:

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Project Overview Purpose:

This project aims to automatically classify rice grain types from images using deep learning. By leveraging transfer learning with MobileNetV2, the model efficiently distinguishes between rice varieties. The application helps in agricultural automation, quality control, and grain classification tasks.

Dataset and Tools Used:

- Dataset: Kaggle Rice Grain Image Dataset
- Model: MobileNetV2 (Transfer Learning)
- Backend: Flask
- Frontend: HTML (Flask Templates)
- Libraries: TensorFlow, OpenCV, NumPy, Pillow

Goals:

- Automate the classification of different rice grain types from images
- Assist farmers, researchers, and industry in rice quality assessment
- Build a scalable and lightweight model for real-time applications
- Provide an easy-to-use interface for prediction and results display

Key Features:

- Upload rice grain images and get instant classification results
- Lightweight, fast inference using MobileNetV2
- Simple and intuitive user interface
- Flask-based architecture for easy deployment

Architecture

Frontend:

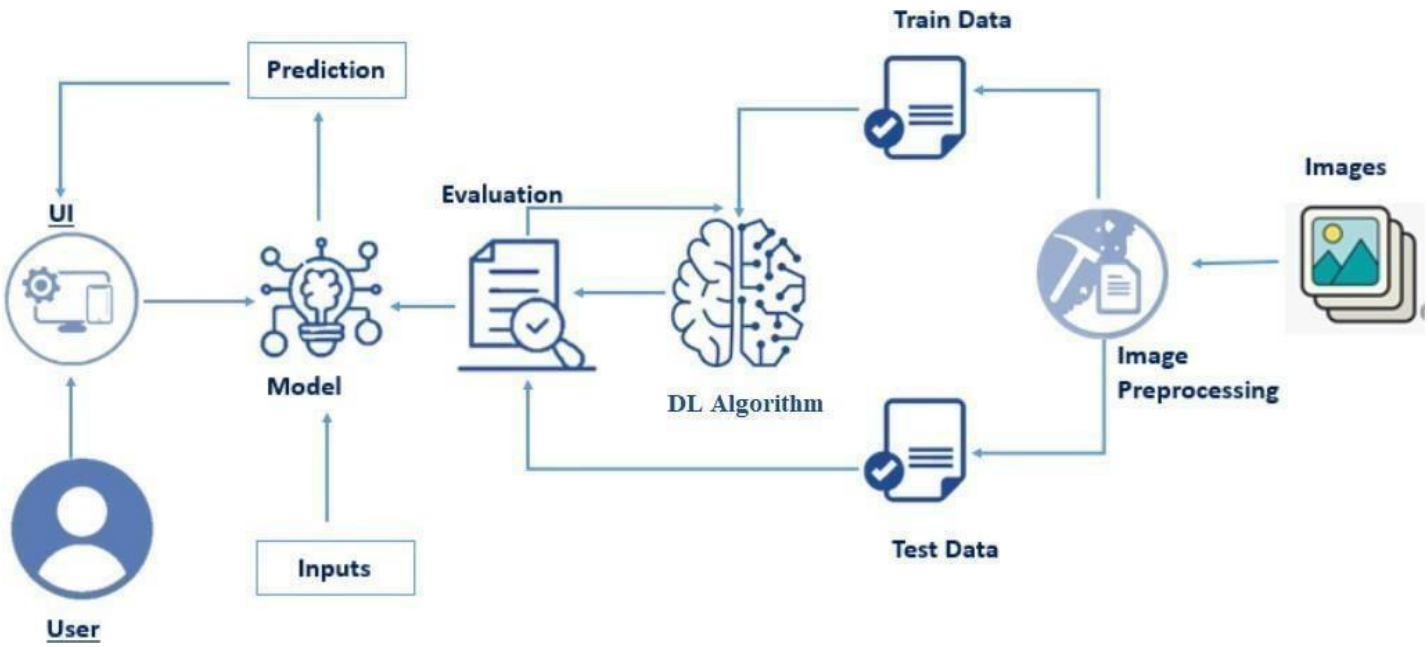
-Built using HTML templates in Flask

- Allows image upload and displays predicted rice type

Backend:

- Handles uploaded images and prediction logic
- Loads pre-trained MobileNetV2 model using TensorFlow- Processes image and returns prediction with confidence score

System Architecture:



Installation Steps:

Step-1: Install Python (3.x)

Download and install Python from the official website: https://www.python.org/downloads/

Step-2:Create a Virtual Environment(Optional but recommended)

Open terminal/command prompt and run: python -m venv rice_env

rice_env\Scripts\activate (for Windows) source

rice_env/bin/activate (for Mac/Linux)

Step-3:Install Required Packages

Make sure you're in the virtual environment, then run: pip

install tensorflow flask opencv-python numpy pillow **Step-**

4:Download the Rice Classification Project Files

Ensure you have the following in your project folder:

- app.py (Flask backend)
- rice_model.h5 (MobileNetV2 trained model) ○ static/ folder (for CSS/images) ○ templates/ folder (for HTML files)

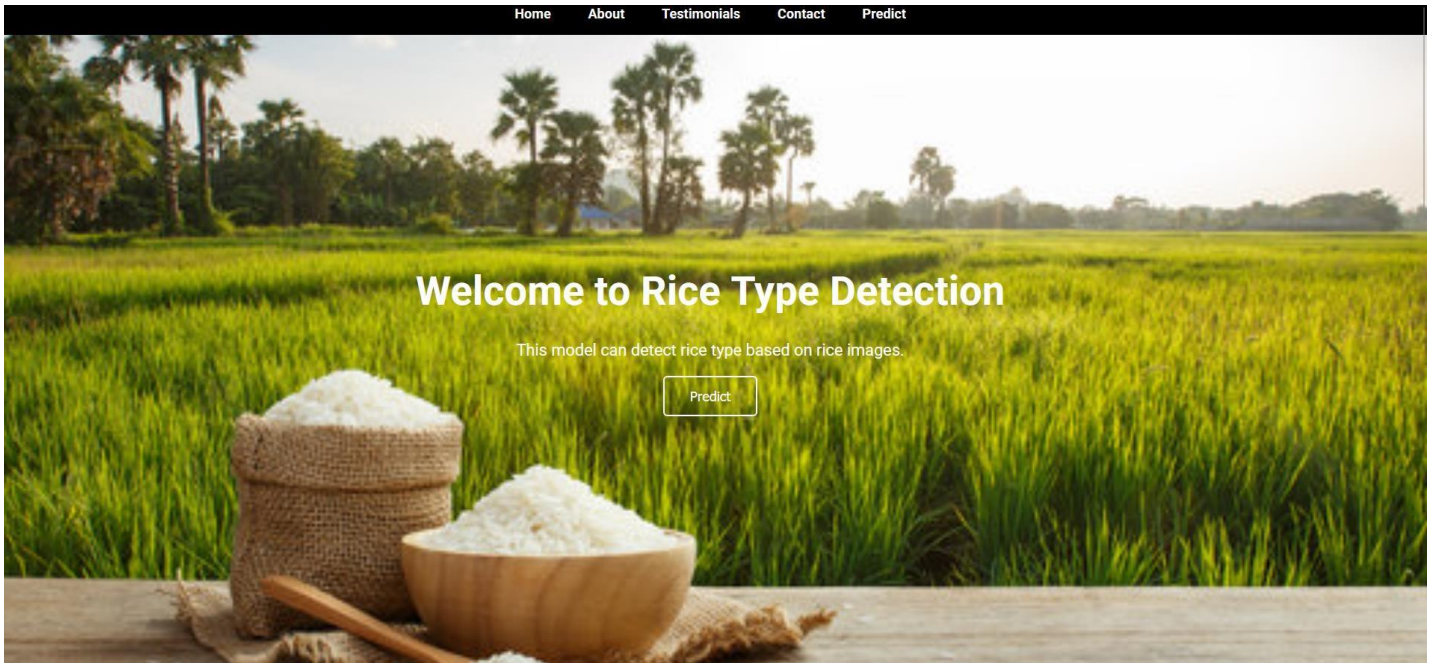
How to Use:

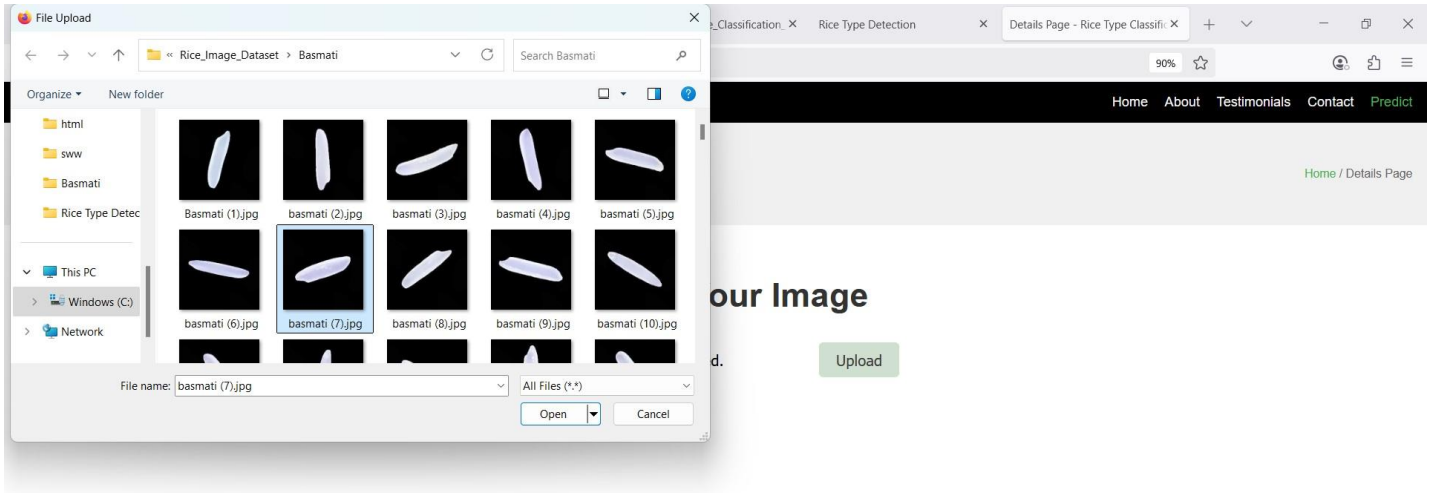
1. Open your terminal or command prompt.
2. .Navigate to the project folder:

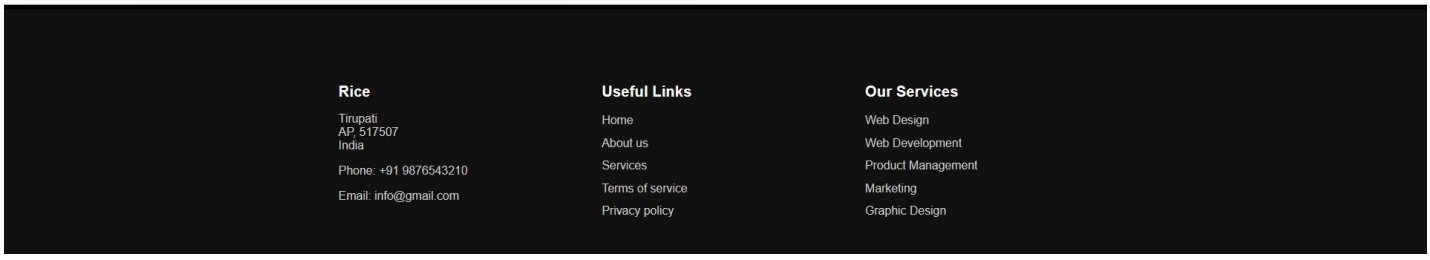
   cd path/to/project

3. Run the Flask application: python app.py
4. open a web browser and go to:
   - http://127.0.0.1:5000
5. Upload a rice grain image using the interface.
6. Click on Predict to see the classification result.

Screenshots or Demo


Home
About
Testimonials
Contact
Predict
Welcome to Rice Type Detection
This model can detect rice type based on rice images.
Predict


File Upload
Rice_Image_Dataset › Basmati
Search Basmati
Organize
New folder
html
sww
Basmati
Rice Type Detec
This PC
Windows (C:)
Network
Basmati (1).jpg
basmati (2).jpg
basmati (3).jpg
basmati (4).jpg
basmati (5).jpg
basmati (6).jpg
basmati (7).jpg
basmati (8).jpg
basmati (9).jpg
basmati (10).jpg
File name: basmati (7).jpg
All Files (*.*)
Open
Cancel
Rice Type Detection
Details Page - Rice Type Classifi
90%
Home
About
Testimonials
Contact
Predict
Home / Details Page
our Image
Upload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Terms of service
Privacy policy
Our Services
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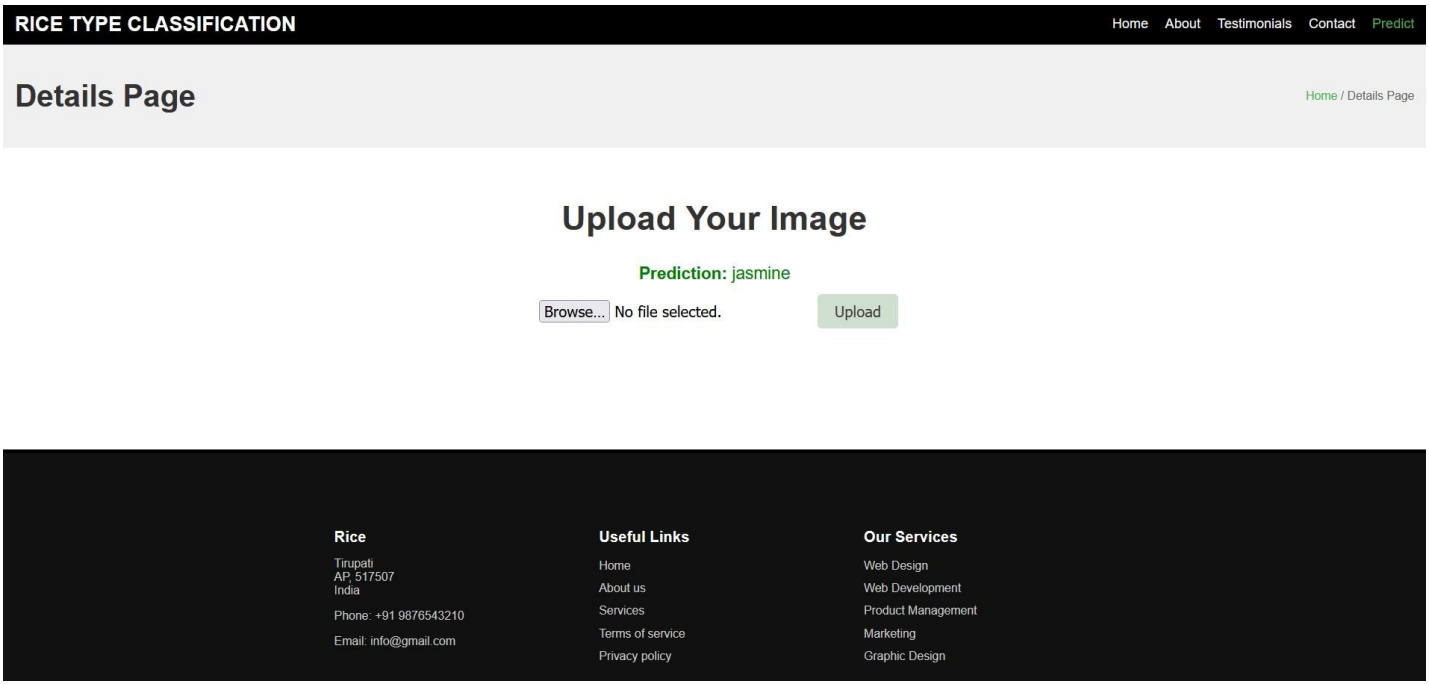
Web Development
Product Management
Marketing
Graphic Design



Future Enhancements:

- Improve accuracy with a larger and more diverse dataset
- Add support for more rice types
- Deploy the model on cloud for remote access
- Add user authentication and prediction history