GrainPalette - Rice Type Detection Using Deep Learning

A Machine Learning Based Classification Project

Submitted by

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Project Objective

To build a highly accurate deep learning-based model that can detect and classify the **types of rice grain** from an image using a trained Convolutional Neural Network (CNN).

Tools & Technologies Used

- Python
- TensorFlow / Keras
- NumPy, Pandas, Matplotlib, Seaborn
- LabelEncoder
- Scikit-learn
- Flask (for Web Deployment)
- HTML, CSS (for Frontend Design)

Dataset Information

The dataset contains **5 different types of rice grains**:

1. Arborio
2. Basmati
3. Ipsala
4. Jasmine
5. Karacadag

Each class contains labeled images for training and testing the model.

Project Workflow

1. **Data Collection** – Images were collected and organized.
2. **Preprocessing** – Resizing, normalization, and label encoding were done.
3. **Model Building** – A CNN architecture was created using Keras.
4. **Training** – The model was trained with high accuracy on rice grain images.
5. **Testing** – Model performance was evaluated using metrics like accuracy and confusion matrix.
6. **Deployment** – Flask was used to create a web application for rice type prediction.

Model Results

- Achieved test accuracy: *~97%*
- CNN with Conv2D, MaxPooling, Flatten, Dense Layers
- Efficient classification for each rice type

Web Application Features

- Upload image of a rice grain
- Predict button shows the result
- Displays input image and the **predicted rice type**
- Neatly designed user interface using HTML & CSS

Key Highlights

- High accuracy with optimized CNN
- Beautiful UI using HTML/CSS
- Real-time prediction using Flask
- Easily extendable for more rice types

Contact Us (Sample Section from Web App)

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Conclusion

This project demonstrates the capability of **deep learning in agricultural classification tasks**, especially using image-based predictions. The model is scalable, efficient, and useful for real-time applications in **agritech**.
