1. 🌾 Rice Type Detection Using Deep Learning

🔍 A Machine Learning Based Classification Project

📋 Submitted by

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🧠 Project Objective

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

🚀 Tools & Technologies Used

- 💻 Python
- 🧠 TensorFlow / Keras
- 📦 NumPy, Pandas, Matplotlib
- 🏷️ 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**.
