






GrainPalette: Rice Classification through Transfer Learning

GrainPalette is a smart deep learning project that classifies different types of rice grains  using images . It uses **MobileNetV2**, a powerful pre-trained model (transfer learning), to identify rice types accurately and efficiently.

Project Overview



GrainPalette is a web app that takes an image of rice grains and tells you what type of rice it is. It's helpful for farmers, quality control teams, and food industries  . The app uses computer vision and deep learning to analyze the grains.

Technologies Used

-  **Frontend:** HTML, CSS, Bootstrap
 -  **Backend:** Flask (Python)
 -  **Model:** MobileNetV2 (Transfer Learning)
 -  **Libraries:** OpenCV, TensorFlow, Keras, NumPy, Pillow
 -  **Visualization:** Matplotlib, Plotly
 -  **Deployment:** GitHub
-

Dataset

We used a rice grain dataset containing images of 5 rice types:

1.  Basmati
2.  Arborio

3. 🍚 Ipsala
4. 🍵 Jasmine
5. 🍲 Karacadag

Each category has 200+ high-quality images used for training and testing.

🧠 Architecture (How it Works)

plaintext

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User Uploads Image 📷



Flask Backend 🔁



Preprocessing (Resize, Normalize) 🔍



MobileNetV2 Model 🧠



Prediction with Confidence 📊



Results + Pie Chart 📈

💪 Model Training Details

- ✅ **Base Model:** MobileNetV2
 - 🖼️ **Input Size:** 224x224 pixels
 - 🔁 **Epochs:** 15–20
 - 📉 **Loss Function:** Categorical Crossentropy
 - 🚀 **Optimizer:** Adam
 - 🎯 **Accuracy:** ~95%
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Graphs & Visuals



Training vs Validation Accuracy

- Shows how well the model is learning over time.



Confusion Matrix (Pie Chart Style)

- Visualizes how the model is predicting each class.



Prediction Confidence Chart

- After uploading a rice image, the app shows how confident it is using a colorful pie chart!

python

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```
# Sample pie chart code
```

```
import plotly.express as px
```

```
fig = px.pie(names=rice_classes, values=prediction_probs,  
title="Prediction Confidence")
```



Features

- ✓ Upload rice grain images
- ✓ Predict rice type instantly
- ✓ Visual confidence results (Pie Chart)
- ✓ Mobile-friendly UI
- ✓ Warns users if image is not of rice 🌐⚠️



How to Use

Clone the project:

bash

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```
git clone
```

```
https://github.com/Aditya25-web/grainpalette-a-deep-learning-odyssey  
-in-rice-type-classification.git
```

1.

Set up the environment:

```
bash
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cd "Project Files"
python -m venv venv
venv\Scripts\activate
pip install -r requirements.txt
```

2.

Run the app:

```
bash
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python app.py
```



3.

Open in browser:

```
arduino
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http://localhost:5000
```

4.

Contributors

-  Aditya Kunchala – Lead Developer
 -  bhavesh pavan-team member
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Future Improvements

- Add more rice varieties 🌾
- Remove background noise for better accuracy 🗣️

- Make the app mobile-friendly 📱
- Allow users to export results as PDF 📄

 **GitHub Repo:**
 [GrainPalette Project Link](#)