GrainPalette − A Deep Learning Odyssey in Rice Type Classification Through Transfer Learning

GrainPalette is an AI-powered system for rice type classification using **deep learning and transfer learning techniques**. It uses pre-trained models to accurately classify different rice grain types based on image inputs. This system aims to support agricultural quality control, automate grain inspection, and enhance food supply chain analytics.

Q Core Features:

- image-based Rice Grain Detection
- Deep Learning Classifier using transfer learning
- Transfer Learning with Pre-trained CNNs (e.g., ResNet, VGG, MobileNet)
- Result Dashboard showing prediction confidence and type
- User Interface for image upload and result display

Technology Stack:

- Frontend: HTML, CSS, JavaScript (for image input & result view)
- Backend: Python Flask / Streamlit (to run inference and serve results)
- AI Models: TensorFlow / PyTorch with pre-trained CNNs (ResNet50, MobileNetV2, etc.)
- Libraries: OpenCV, NumPy, Pandas, Matplotlib

How It Works:

- 1. **Image Preprocessing** Resize, normalize, and enhance the input image.
- 2. **Model Inference** Use transfer learning with a fine-tuned CNN model.
- 3. **Prediction Output** Show the rice type and confidence score.

4. **Optional** – Export report or integrate into agricultural monitoring systems.



bash

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pip install -r requirements.txt

python app.py # (Flask version)

Or for Streamlit version:

bash

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streamlit run app.py

Would you like a poster, PowerPoint, or project report version of this? I can also add:

- Flowchart or architecture diagram
- Model training details
- Accuracy and confusion matrix
- Dataset information (e.g., Rice Image Dataset)