

Project Design Phase

Solution Architecture

Date	19 February 2026
Team ID	LTVIP2026TMIDS89552
Project Name	Smart Sorting: Transfer Learning for Identifying Rotten Fruits and Vegetables
Maximum Marks	4 Marks

Solution Architecture:

The solution architecture of **NutriGaze** bridges the gap between the real-world problem of food quality inspection and an AI-driven technological solution. It defines how user requests flow through the system, how data is processed, and how predictions are generated and delivered.

The architecture ensures:

- Efficient image processing and classification
- Clear separation between UI, backend logic, and ML model
- Scalability and maintainability
- Secure and reliable deployment
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Architecture Overview:

NutriGaze follows a **3-Tier Architecture**:

Presentation Layer (User Interface)

- Built using HTML, CSS.
- Allows users to upload fruit/vegetable images.
- Displays prediction result.
- Communicates with backend using HTTP requests.

Application Layer (Backend Server)

- Developed using Flask.
- Handles:
 - Image upload
 - Image preprocessing (resizing, normalization / VGG preprocessing)
 - Model loading
 - Prediction logic
- Sends prediction results back to UI.

ML Model Layer

- Pre-trained **VGG16** model (Transfer Learning)
- Custom classification head (28 classes)
- Outputs probability scores using Softmax
- Saved as .h5 model file and loaded during runtime

Data Flow Description:

Below is the step-by-step data flow of your system:

1. User uploads an image through the web interface.
2. The image is sent to the Flask backend.
3. Backend preprocesses the image:
 - Resize to (224 × 224)
 - Convert to array
 - Apply preprocessing (VGG preprocess_input)
4. The processed image is passed to the trained deep learning model.
5. Model predicts class probabilities.
6. Highest probability class is selected.
7. Prediction is returned to frontend and result is displayed to the user.

Solution Architecture Diagram:

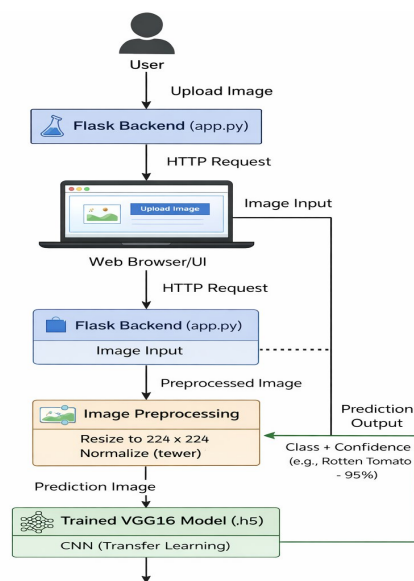


Figure 1: Architecture and data flow of the NutriGaze Freshness Detection Application