**Smart Sorting: Transfer Learning for Identifying Rotten Fruits and vegetables**

**Team ID:**

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**Phase 1: Rotten Fruits, vegetables & Identification**

**Problem statement:** The food industry faces challenges in identifying rotten fruits and vegetables promptly. Delayed detection leads to food waste, health risks, and financial losses, highlighting the need for an automated, accurate system for early identification of spoilage.

**Proposed Solution:** We proposed an AI-based system using transfer learning to automatically detect rotten fruits and vegetables from images. This enables fast, accurate, and cost-effective sorting to reduce waste and improve food quality control.

**Target Users:** Food processing industries, supermarket chains, smart home appliance manufacturers, agricultural suppliers, and farmers seeking automated solutions for quality control and waste.

**Expected Outcome:** An accurate and efficient image-based system capable of automatically detecting rotten fruits and vegetables, leading to reduce food waste, improved quality control, and enhanced productivity across agricultural, retail, and household settings.

**Phase 2: Requirements Analysis**

**Technical Requirements:**

* + Python
  + TensorFlow / Keras
  + ResNet50, HTML
  + Jupyter Note Book

**Functional Requirements**

* Upload image
* Predict rotten fruits, vegetables using trained model
* Display result

**Constraints & Challenges:**

* Model accuracy depends on data set quality
* Limited labelled images for rotten fruits and vegetables
* Hardware Limitations
* Real-Time Processing

**Phase 3: Project Design**

* **System Architecture Diagram: User Flow:**

  User User opens the web application

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 Upload Image Click on “Get Started” button

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  Flask Backend upload image of fruits or vegetables

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Transfer Learning Model Click on “Submit”

   (e.g., ResNet50)                                     ⇩

  ⇩       system displays whether

  Prediction the item is fresh or rotten

  (Fresh or Rotten Classification)

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           Result Display

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**UI/UX Considerations:**

* + Simple upload form with image preview
  + Predict Button
  + Result section with rotten vegetable and fruit name

**Phase 4: Project Planning (Agile Methodologies)**

* **Sprint Planning**
* Week 1: Dataset collection & preprocessing
* Week 2: Model training and tuning
* Week 3: Flask integration
* Week 4: Frontend + Testing + deployment
* **Task Allocation:**
  + Member A: Model training
  + Member B: Flask backend
  + Member C: Frontend UI
  + Member D: Documentation & testing
* **Timeline & Milestones:**
* Milestone 1: Dataset ready (week 1)
* Milestone 2: Model trained (week 2)
* Milestone 3: Web integration (week 3)
* Milestone 4: Testing + Report (week 4)

**Phase 5: Project Development**

* **Technology stack used:**

Python Flask, Tensor Flow / Keras, ResNet50, HTML

* **Development Process:**
* Trained Res Net50 on rotten dataset
* Created app.py with prediction route
* HTML templates for UI
* Uploaded image saved and pre-processes
* Model predicts and result shown on predict.html
* **Challenges & Fixes:** 
  + ResNet50 needed image shape fixing – Solved with img \_to\_ array & resizing
  + File not saving correctly – fixed with os. path. join ()
  + Styling issues fixed via HTML templates updates

**Phase 6: Functional & Performance testing**

* **Test cases Executed:**
  + Uploaded valid / invalid image formats
  + Checked correct predictions for known test images
  + UI responsiveness and error handling
* **BUG Fixes & improvements:**
  + Fixed image upload not found bug
  + Added image preview and file name display
  + Improved styling for better UX
* **Final Validation:**
* Project meets objectives of identifying rotten fruits and vegetables
* Easy for non- technical users