

## **SMART SORTING : TRANSFER LEARNING FOR IDENTIFYING ROTTEN FRUITS AND VEGETABLES**

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### **CHAPTER-4**

#### **4.1 PROBLEM SOLUTION FIT**

The core problem identified in retail markets and supermarkets is the difficulty in accurately detecting rotten or damaged fruits and vegetables during sorting and billing. Customers often rely only on visual inspection, which is not always reliable. Some fruits may appear fresh externally but may have internal spoilage or early-stage fungal growth. This leads to customer dissatisfaction, food wastage, financial loss, and damage to store reputation. Store managers also face challenges in monitoring quality consistently and reducing the number of spoiled products displayed for sale.

The proposed Smart Sorting system directly addresses these issues by using computer vision and transfer learning to automatically detect rotten produce in real time. Instead of manual inspection alone, the system captures images through a camera and processes them using a deep learning model trained to recognize discoloration, texture changes, mold patterns, and surface damage. Frameworks such as TensorFlow enable the use of pre-trained convolutional neural networks that can be fine-tuned specifically for freshness detection. This ensures higher accuracy and faster processing compared to traditional methods.

The solution fits the problem because it targets the exact pain points experienced by both customers and retailers. Customers gain confidence in the quality of products they purchase, reducing the risk of buying spoiled items. Retailers benefit from reduced complaints, lower wastage, improved inventory control, and enhanced brand trust. The integration of weight sensors and automatic billing further improves efficiency and minimizes human error.

From a technical perspective, transfer learning makes the solution practical and scalable. Instead of requiring massive datasets and expensive infrastructure, the system leverages existing pre-trained models and adapts them to the specific use case of rotten fruit detection. This reduces development cost and implementation time, making the solution feasible for small and large retail environments.