

PHASE-1: BRAINSTORMING & IDEATION

OBJECTIVE

The primary objective of this phase is to initiate the project by identifying the root problem faced in the agriculture and retail industries with respect to fruit and vegetable sorting. It aims to define the mission of the 'Smart Sorting' solution and align the team around a shared vision. This phase sets the groundwork by clarifying the real-world impact the project is expected to have and encourages innovative ideas.

We seek to design a sustainable, AI-powered model that can transform how fresh produce is handled and sorted in real-time with accuracy and reliability, especially in high-volume environments.

KEY POINTS

Problem Statement

Manual sorting of fruits and vegetables is traditionally performed based on visual inspection by workers. However, this approach is highly subjective, inconsistent, and prone to errors. Large-scale farms and supply chains struggle to maintain uniform quality checks, leading to spoiled items reaching the market or good produce being discarded. With increasing consumer demand for freshness and safety, traditional methods no longer suffice.

Proposed Solution

Our solution leverages Transfer Learning – an advanced machine learning technique – by retraining pre-trained convolutional neural networks (CNNs) on a custom dataset of fruits and vegetables, categorized as fresh or rotten. This enables the model to rapidly classify images of produce captured by a camera. The output

classification can then trigger actuators or indicators to sort the items automatically. This system can be implemented in conveyor belt setups, mobile apps for farmers, or warehouse automation systems.

Target Users

The 'Smart Sorting' system can benefit multiple user segments:

- Farmers needing efficient pre-sale sorting
- Grocery and supermarket chains
- Cold storage and warehousing units
- Food exporters and quality auditors
- Government agencies promoting food safety
- Agricultural startups and agri-tech innovators

Expected Outcome

By the end of this phase, we expect to have:

- A clear and validated problem statement
- A conceptual design of our proposed solution
- Identification of key datasets and model architecture
- Defined success metrics such as sorting accuracy, model performance, and scalability
- Awareness of challenges such as data imbalance, poor lighting in real-world conditions, and hardware compatibility

Ultimately, this phase provides a roadmap for building a smart, AI-based, image-driven sorting system that can redefine efficiency, accuracy, and productivity in the agri-supply chain.