PHASE 2: REQUIREMENT ANALYSIS

After thoroughly analyzing the core idea behind the project, Requirement Analysis becomes the next critical phase. This stage focuses on determining both the technical tools and the functional capabilities necessary for successfully developing the AI-based freshness detection system. By clearly outlining these requirements, we ensure that the implementation process is smooth, structured, and goal-oriented.

Technical Tools and Libraries

In terms of technical requirements, the project is developed using the Python programming language due to its simplicity and strong ecosystem for machine learning and image processing tasks. Several important libraries are utilized:

- TensorFlow – used for building and deploying machine learning models
- Keras – a high-level API for neural network implementation (included in TensorFlow)
- OpenCV – for image processing and computer vision tasks
- NumPy – supports efficient numerical computations and array manipulation
- Matplotlib – used for visualizing training progress and displaying images
- Pillow (PIL) – for opening, manipulating, and converting images

These libraries form the technical backbone of the system, enabling effective development, real-time inference, and image handling throughout the pipeline.

Functional Capabilities

On the functional side, the system must:

- Support real-time classification
- Include a user interface for interaction and display of results
- Perform image preprocessing such as resizing and normalization
- Handle batch datasets for model training and testing

By specifying these tools and requirements in advance, the development process becomes more organized and sets a clear path toward building a scalable and intelligent system aimed at reducing food waste and improving agricultural efficiency.