Amrita School of Computing
Department of Computer Science and Engineering

Minor Project: 19CSE495
(2020-2024 B.Tech CSE)

Problem Definition Document

I. Project Title:

Precision Agriculture: Thermal Imaging for Sapota Ripeness

II. Team members:

Roll No.	Name
AM.EN.U4CSE20162	SHAIK AQIBUDDIN
AM.EN.U4CSE20143	MELLACHERUVU RAVITEJA
AM.EN.U4CSE20159	S MITHILTEJA
AM.EN.U4CSE20172	V VENKATA VARUN KUMAR REDDY

III. Abstract

Thermal imaging is a promising technology with various applications, including non-destructive assessment of fruit ripeness. This project aims to develop a novel approach using thermal imaging to accurately determine the ripeness of fruits, with a focus on peach and sapota (chikoo). By capturing thermal images of fruits at different stages of ripeness, we create a diverse dataset for training and testing a machine learning model. The dataset is preprocessed and annotated with corresponding ripeness labels, facilitating supervised learning. Advanced image processing techniques are employed to enhance relevant features in the thermal images, with temperature as the primary indicator of ripeness.

The project leverages deep learning algorithms to train a model capable of classifying fruits as underripe, ripe, or overripe based on thermal images. The model's performance is rigorously evaluated on a separate testing dataset to ensure accurate and reliable results. We address the need for real-time applications by considering the implementation of the trained model on a thermal imaging system in a production or distribution line.

To ensure ethical considerations, data collection is done responsibly, and participant consent is obtained when applicable. Moreover, the project acknowledges the influence of environmental factors on thermal readings and implements calibration procedures to maintain accuracy.

While thermal imaging provides valuable insights into fruit ripeness, we acknowledge that additional factors like aroma, texture, and color might also influence the assessment. As such, this project complements existing methodologies for fruit ripeness detection, offering a non-invasive and potentially automated solution.

By combining expertise from computer vision, machine learning, agriculture, and food science, this research contributes to the advancement of fruit quality assessment methods. The results are expected to have implications for fruit producers, distributors, and consumers, enhancing decision-making processes throughout the supply chain.

The novelty of our approach lies in its non-destructive nature, enabling fruits to remain intact and suitable for consumption after assessment. Ultimately, this project seeks to bridge the gap between cutting-edge technology and the agriculture industry, fostering sustainable and efficient practices for fruit ripeness evaluation.

IV. Motivation

This project is driven by the pressing need to revolutionize fruit ripeness assessment in the face of global food demand and agricultural challenges. Traditional methods for evaluating ripeness often lack accuracy, leading to inefficiencies and food waste. To address these issues, we are motivated to explore the potential of thermal imaging technology as a game-changing solution.

Thermal imaging offers a non-invasive and contactless means of capturing temperature variations in fruits as they ripen. By harnessing machine learning and computer vision techniques, we aim to develop a novel approach to accurately classify fruits as underripe, ripe, or overripe based on thermal profiles. This automated method could streamline the assessment process and empower farmers and distributors with data-driven decisions.

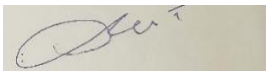
A key motivation is the potential impact on reducing food waste. The current discard of fruits due to inaccurate ripeness assessments leads to economic losses and environmental repercussions. By

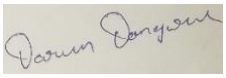
providing a reliable and non-destructive means of determining fruit ripeness, we aspire to minimize unnecessary waste and contribute to a more sustainable food system.

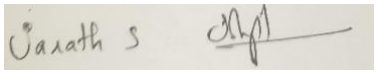
Student's Name and Signature

SHAIK AQIBUDDIN : 

MELLACHERUVU RAVITEJA : 

S MITHILTEJA : 

V VENKATA VARUN KUMAR REDDY : 



Guide's Signature