

**RECOGNIZING THE RIPENESS OF BANANAS USING  
ARTIFICIAL NEURAL NETWORK BASED ON  
HISTOGRAM APPROACH**

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## ABSTRACT

This paper presents about recognizing the ripeness of bananas using artificial neural network based on histogram approach. Neural networks are composed of simple elements operating in parallel. These elements are inspired by biological nervous systems. As in nature, the network function is determined largely by the connections between elements. Neural network were train to perform a particular function by adjusting the values of the connections between elements. Commonly neural networks are adjusted, or trained, so that a particular input leads to a specific target output. There, the network is adjusted, based on a comparison of the output and the target, until the network output matches the target.

The main objective of this project is developing the technique to classify the ripeness of bananas into 3 categories, which is unripe, ripe and overripe systematically based on their histogram RGB value components. This system involved the process of collecting samples with different level of ripeness, image processing and image classification by using artificial neural network. Collecting bananas sample is done by using Microsoft NX6000 webcam with 2 mega pixels. Image processing stage involves procedure such as image resizing and RGB histogram. 32 samples were used as training for artificial neural network. In order to see whether the method mention above can classify the image correctly, another 28 images was used as testing. From the result obtained, it was shown that the artificial neural network can generally classify the ripeness of bananas. This is because it can classify up to 25 samples correctly out of 28 samples. Developing a program totally by using Matlab version 7.0 can help classification process successfully.

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# CHAPTER 1

## INTRODUCTION

### 1.1 AN OVERVIEW

The use of computers to analyze images has many potential for agricultural tasks. There are many processes in agriculture where decisions are made based on the appearance of the product. Applications for grading the fruit by its ripeness, quality or size are based on its appearance [1].

Various ripeness techniques have been described in the literature and many of them are being used for real-time authentication, the most popular ones being used are mean of RGB identification [2].

Method on identifying ripeness of bananas by distinguishes the hue and colour intensity of the colour using image processing is tough. This is because to the toughness of detecting the ripeness of the different types of bananas. Furthermore, there exists some "similar" colour between the ranges of ripeness on the bananas, example from unripe and ripe. Skin colour that covered bananas that was not uniformly also given big problem in detecting the ripeness of the bananas [3].

In contrast to limitations of classical computing, Artificial Neural Networks (ANN), that were first developed in 1943 by the neurophysiologist Warren McCulloch and the logician Walter Pitts serve for the technique of human thinking [13]. Neural network method is employed to recognize the ripeness of bananas. The method can achieve