 ISSN: 2597-8993

Identification of Red Dragon Fruit Using Backpropagation Method Based on Android

[1] Damar Prasetyo, [2] Renggo Danu Murti Bimantaka

[1] *Department of Information Systems, Faculty of Information Technology and Electrical Engineering*
University of Technology Yogyakarta, Indonesia
[1] damar.prasetyo@uty.ac.id, [2] renggodanu@gmail.com

ARTICLE INFO

Article history:
Received June 25, 2018
Revised July 25, 2018
Accepted August 29, 2018

Keywords:
Backpropagation, Red Dragon Fruits, Image Processing, Android

ABSTRACT

Ripeness identification of red dragon fruit using conventional methods has a lack of ripeness accuracy, due to the subjective nature of the election or lack of understanding of science in choosing a ripe red dragon fruit. This research was conducted to create a system to identify the ripeness level of red dragon fruit using artificial neural networks backpropagation method with image processing. The stages of the research are 4 steps process, namely preprocessing, training, testing carried out in Matlab and predictions made on the Android system. The data used are 30 images of red dragon fruit which have different levels of ripeness, 10 raw categories, 10 ripe categories, and 10 categories too ripe. the results of the identification of each of the 20 raw dragon fruit images, ripe, and too ripe, can recognize 100% in raw category, 100% in ripe category, and 85% in too ripe category

I. Introduction

The process of identifying the ripeness of red dragon fruit conventionally experiences many obstacles due to subjective nature in the selection or lack of understanding of knowledge in choosing ripe fruit so that it results in inaccuracy in the selection of red dragon fruit.

This study aims to determine the percentage of success of the backpropagation method in the recognition of red dragon maturity based on the grade of the colors Red, Green, Blue (RGB).

Reference [1] suggests that researchers identify the ripeness of banana fruit with artificial neural network techniques. Its Input is a banana image and it is identified based on the RGB color histogram. The observation of ripeness is grouped into raw bananas, unripe banana, ripe bananas, and too ripe bananas. The determination of classification uses the backpropagation method. The result shows that in the group of 100% raw bananas, it is recognized as raw banana, in the group of unripe bananas, it is successfully recognized the 80% as unripe bananas, in the group of ripe bananas, it is recognized 100% as ripe bananas, and in the group of ripe bananas, it is 100% recognized as ripe bananas.

References [2] show that researchers build an introductory system of citrus fruit ripeness by the processing of artificial neural network imagery with backpropagation. This system can identify the ripeness of citrus fruits based on colors where there is a plural layer that makes the network get a balance between the network's ability to recognize the patterns used during training and the ability to provide a correct response to similar input patterns. The result obtained is a 100%, the percentage rate of raw orange group 100% of the ripe orange group, and 80% of too ripe orange group.

Reference [3] shows that researchers make a system of recognition of fruit ripeness of markisa with image processing of artificial neural networks. The condition of fruit ripeness is determined by the color of markisa. The system is built with image processing with the backpropagation method. Based on the grades of Red, Green, Blue (RGB) as references, the classification of ripe markisa can be recognized 100%, unripe 83.3%, and raw markisa 100%.

An Artificial Neural Network is defined as an information processing system that has characteristics resembling human neural networks [4]. Backpropagation is one of the algorithms that is often used in solving complex problems [4].

Identification is a determinant or determination of the identity of a person, object, and others. Identifying is determining or establishing the identity of people, objects, and so on. Hence it can be concluded that the identification system is a system that will be built to determine or determine the identification of objects or people.

Dragon fruit (Hylocereus costaricensis) is the fruit of several types of cacti from the classes oif Hylocereus and Selenicereus. This fruit originates from Mexico, Central America and South America but it is now also cultivated in Asian countries such as Taiwan, Vietnam, the Philippines, Indonesia and Malaysia [5].

Image processing is a general term for various techniques whose existence is to manipulate and modify images in various ways [6]. Photos are examples of two-dimensional images that can be easily processed. Each photo in the form of a digital image (i.e. from a digital camera) can be processed through certain software. For example, if the camera shots look dark, the image can be processed to be brighter. It is also possible to separate a person's photo from its background.

II. Research Methods

There are 4 flowcharts on the design of the Red Dragon Fruit identification system. First is a preprocessing flowchart (Shown Figure 1) where the fruit photos will be taken, and in the process, they are to be used as training data, preprocessing generates data in the form of grade means RGB of the fruit image taken. Second is the training data flowchart (Shown Figure 2) is the process of data processing means RGB to get the grade of weights and bias. The third is testing (Shown Figure 3), the testing process is useful to know the target grade of the fruit image that has been taken before, it would be better if the target grade is close to 100%. Fourth is the prediction flowchart explaining the process that occurs in the user's smartphone (Shown Figure 4). The process is taking photos of red dragon fruit, then cropping and resizing. Finally, the system will assess the fruits into the parameters of raw, ripe, or too ripe.

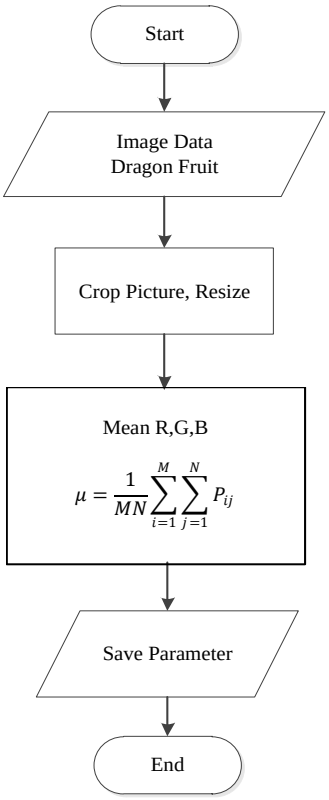

Fig. 1 Preprocessing Flowchart

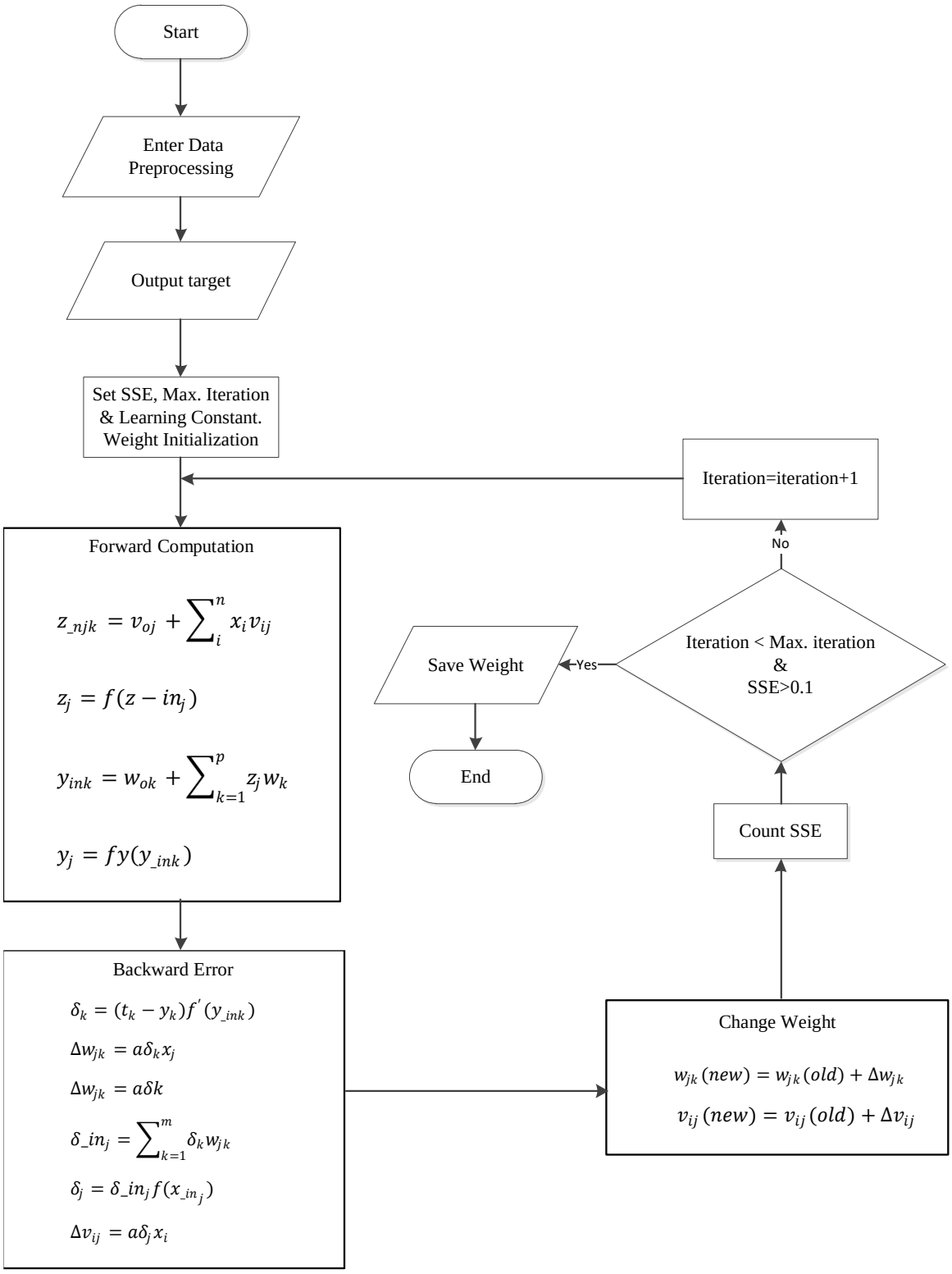

Fig. 2 Training Data Flowchart

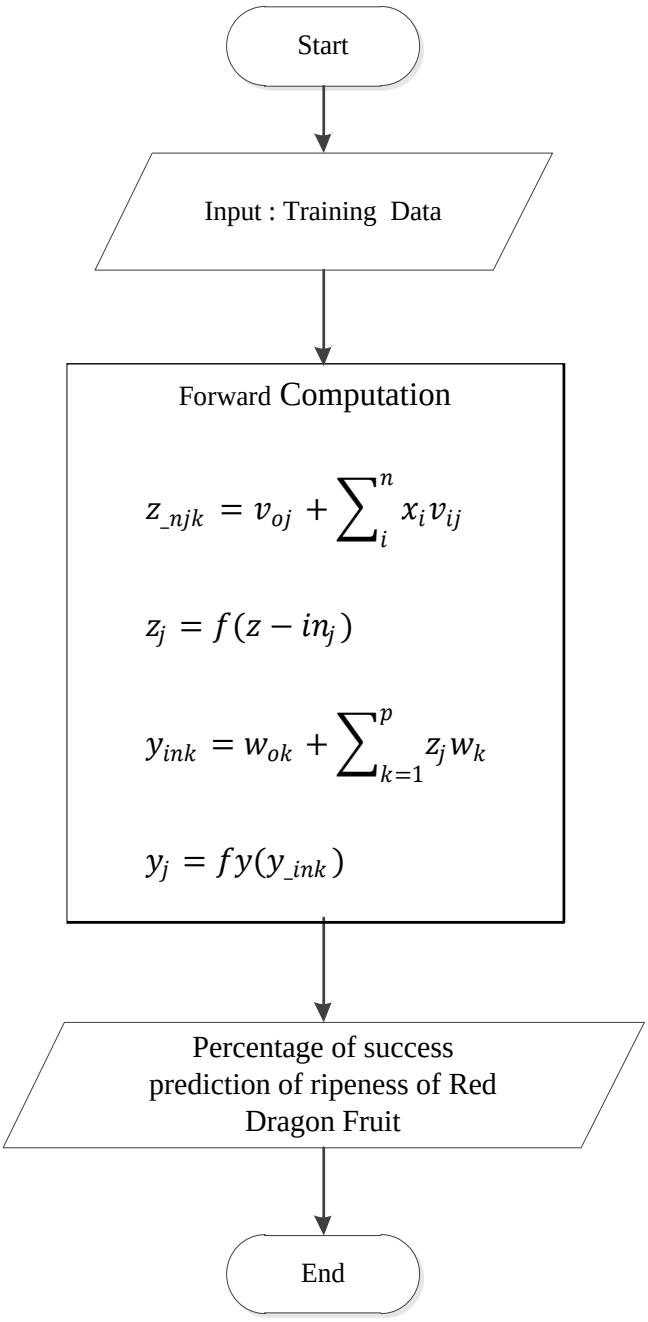

Fig. 3. Testing Process Flowchart

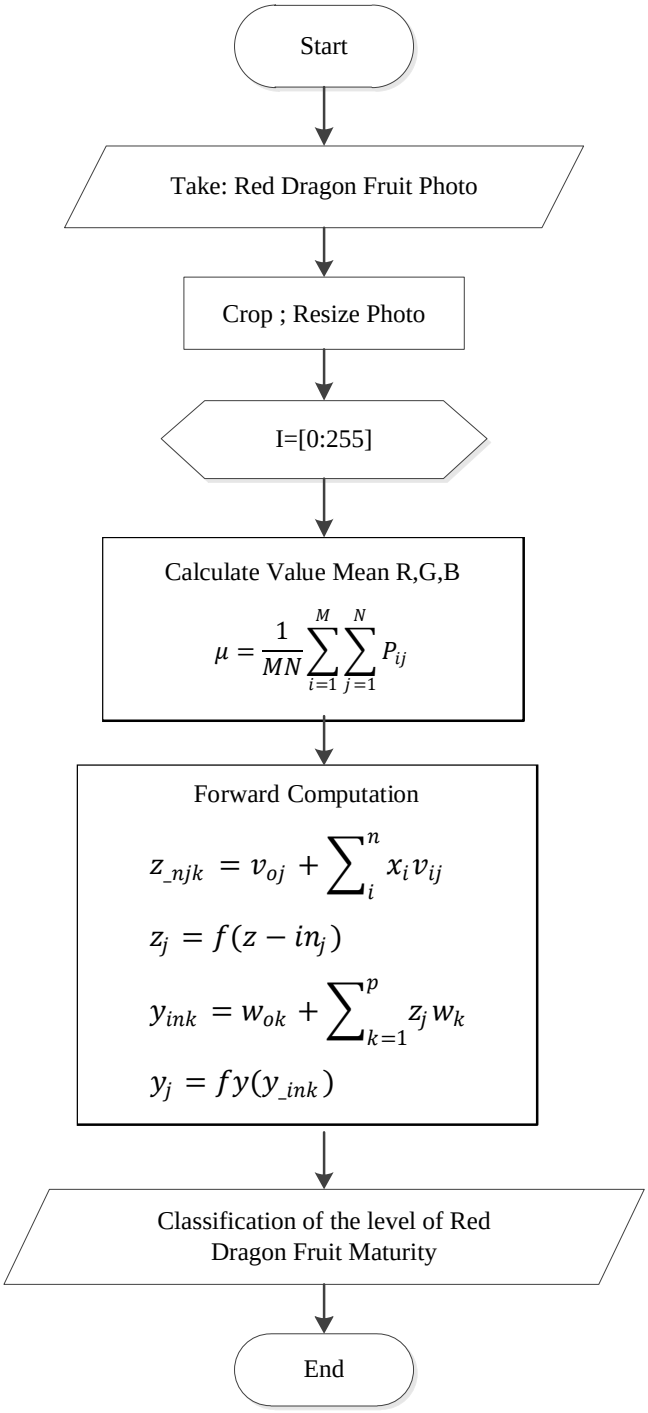

Fig. 4. The Prediction Flowchart

The designing of Neural Network Backpropagation illustrates the process of backpropagation of the parameter grade of the fruit used for testing, which consists of 10 raw red dragons, 10 ripe red dragons, and 10 too ripe red dragon fruit.

The input layer consists of 3 parameters that mean R, means G, and means B. The grade is derived from the preprocessing process. Then calculations are performed with the backpropagation method on hidden layer to get appropriate weight. After obtaining the appropriate weight, will exit the result info in the layer output according to the classification of fruit ripeness. The design of Artificial Neural Network backpropagation can be seen in Figure 5.

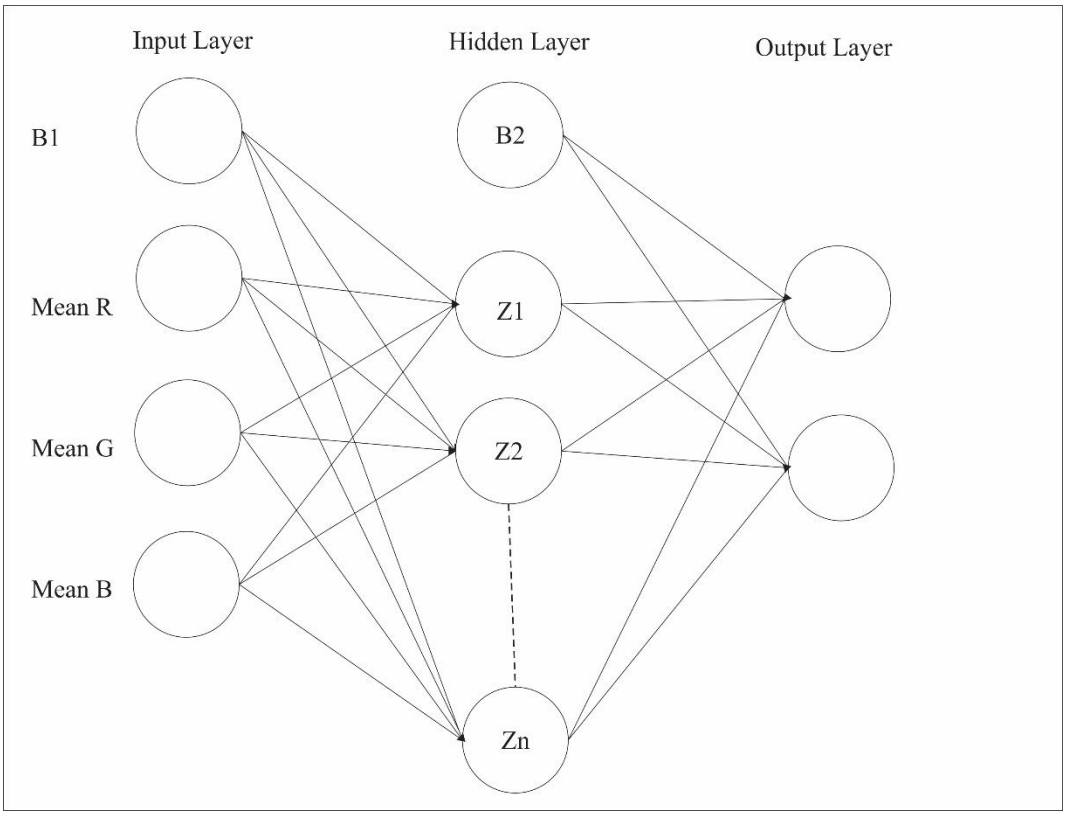

Fig. 5 The design of Artificial Neural Network Backpropagation

III. Results and Discussion

Based on the analysis and planning of the system that has been done in the previous chapter then a system generated is. It detects the ripeness of red dragon fruit entitled Identification of the Red Dragon Fruit Ripeness using the method of Backpropagation Android-based. The system is built with the Java programming language using Android Studio. To use this application, users should install the application on the smartphone used. Installed files are formatted APK.

The success percentage of test ripeness on dragon fruit with the calculation of means RGB reaches a percentage of 96.67%. Percentage of success prediction of ripeness of red dragon fruit on the Smartphone application of raw group 100% was successfully recognized, the ripe group 100% successfully recognized, and the too ripe group 85% was well recognized. The drawback of this system is that the system is unable to distinguish the form of objects that are detected, the system will only do the color assessment on the incoming image

IV. CONCLUSION

The conclusions after conducting research and experiments are as follows:

1. The system of ripeness identification of red dragon fruit with a backpropagation method can run well in recognizing the ripeness level of red dragon fruit; raw, ripe, and too ripe.
2. The success percentage of test ripeness on dragon fruit with the calculation of means RGB reaches a percentage of 96.67%.
3. Percentage of success prediction of ripeness of red dragon fruit on the Smartphone application of raw group 100% was successfully recognized, the ripe group 100% successfully recognized, and the too ripe group 85% was well recognized.
4. The drawback of this system is that the system is unable to distinguish the form of objects that are detected, the system will only do the color assessment on the incoming image.

5. The advantages of this system are able to recognize the red dragon ripeness precisely with the calculation of RGB color histogram based on 3 levels of ripeness that are raw, ripe, and too ripe

References

[1] Siregar, T.M., Harahap, L.A., and Rohanah, A., (2015), "Teknik Jaringan Syaraf Tiruan (identification of Banana Maturity (Musa paradisiaca) with Artificial Neural Network)", Vol 3 No 2, hal: 261–265.

[2] Agian, D.G., Harahap, L.A., and Panggabean, S., (2015), "Pengolahan Citra Menggunakan Jaringan Syaraf Tiruan (Identification of Passion fruit Maturity with Image Processing Using Artificial Neural Network)", Vol 3 No 3.

[3] Warman, K., Harahap, L.A., and Munir, P., (2015), "Identifikasi Kematangan Buah Jeruk Dengan Teknik Jaringan Syaraf Tiruan (Identification of Citrus Maturity with Artificial Neural Network)", Vol 3 No 2, hal: 248–253.

[4] Hermawan, A., (2006), "Jaringan Saraf Tiruan Teori dan Aplikasi", Penerbit Andi, Yogyakarta.

[5] Kristanto, D., (2014), "Berkebun Buah Naga", Penebar Swadaya.

[6] Kadir, A., and Susanto, A., (2013), "Teori dan Aplikasi Pengolahan Citra", Penerbit Andi, Yogyakarta.