

# Classification Of Determination Of Sweet Siwalan Fruit Based On Color Feature Using Svm Support Vector Machine Method

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**Abstract**

*Siwalan fruit is usually called a fruity fruit, not everyone knows about this fruit because this fruit only exists in certain regions in Indonesia. This fruit is very nutritious because it contains a lot of nutrients and has a sweet taste. But ordinary people determine the level of sweetness by means of manually tasting it directly. And with this research can help the community to distinguish between sweet and non-sweet siwalan, a system that can help classify siwalan fruit based on color is designed. With the SVM (Support Vector Machine) method and the method used is a learning machine method that can find the best hyperplane that separates 2 classes in the input space. It can be seen that the overall test data of 20 data from 3 taste siwalan (sweet, medium, lacking), the testing data obtained the highest level of accuracy of 90%, and can be said that SVM has a better level of accuracy.*



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## I. INTRODUCTION

This classification system was created to help the community in terms of distinguishing siwalan fruit. Siwalan with the Latin name *Borassus Flabellifer* is a type of siwalan tree which is commonly called an ental tree. The siwalan fruit has many benefits, one of which is the abundance of nutrients that can be used to treat liver disease. Siwalan fruit can be found on the coast of East Java [1].

Siwalan fruit is indeed foreign to some people. This is reasonable because the fruit which is also known as the ental fruit is only found in certain areas in Indonesia. This tree, which looks like palms and coconut trees, has no branches and can grow up to 30 meters high [2].

This fruit has a sweet taste, but for ordinary people to determine its sweetness, they still use the manual method, namely by tasting directly from the fruit. Therefore, this research was made.

The classification process in this study uses the support vector machine (SVM) method because the method used is the learning machines method, which works by finding the best hyperplane that separates 2 classes in the input space. (SVM) also provides very good performance results in many proofs [3].

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## II. RELATED WORKS

Research Ichwan, Dewi, & S, (2018). "Support Vector Machine (Svm) Classification To Determine Sweetness Level Of Mangoes Based On Color Features". The National Institute of Technology. This researcher used a destructive method by taking samples directly. This study uses the SVM method as an implementer and K - Nearest Neighbor (K-NN) as a comparison method. Another study was conducted by Manik & Saragih (2017) entitled Classification of Carambola Using Naive Bayes Based on Residents' R&G Features. This researcher uses feature extraction, namely the values of Red, Green, and Blue to get features in color images. The accuracy obtained is 80% [4], [5].

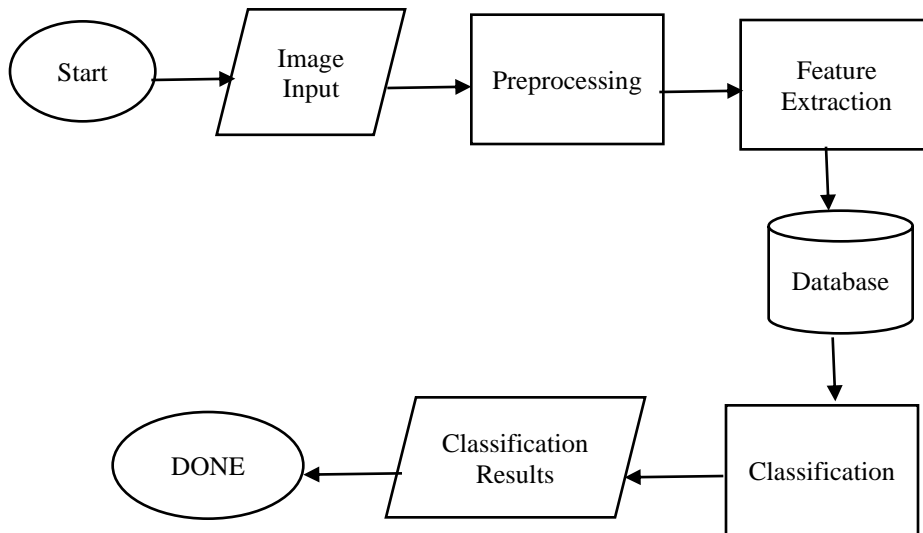
Unlike previous research, this research has 6 criteria, namely metric, eccentricity, contrast, correlation, energy, homogeneity. The method used is SVM. A relatively new method for making predictions, both in classification and regression. The accuracy obtained is 90% [6], [7].

## III. METHODS

System design is a set of elements that are interrelated and interact in an input or output so as to produce the desired output or output. The design of this system will explain the system modeling used and the design of the display or user-interface used in the application "Classification to determine the level of sweetness of siwalan fruit based on color features using the Support Vector Machines (SVM) method [8], [9].

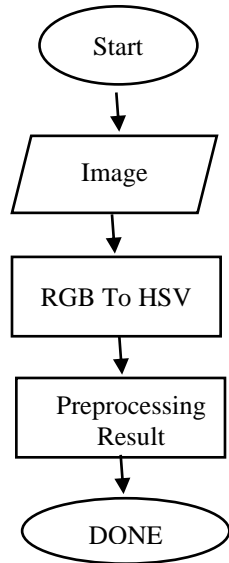
### 1. Overall flowchart

Flowchart is a picture or process flowchart in this study.



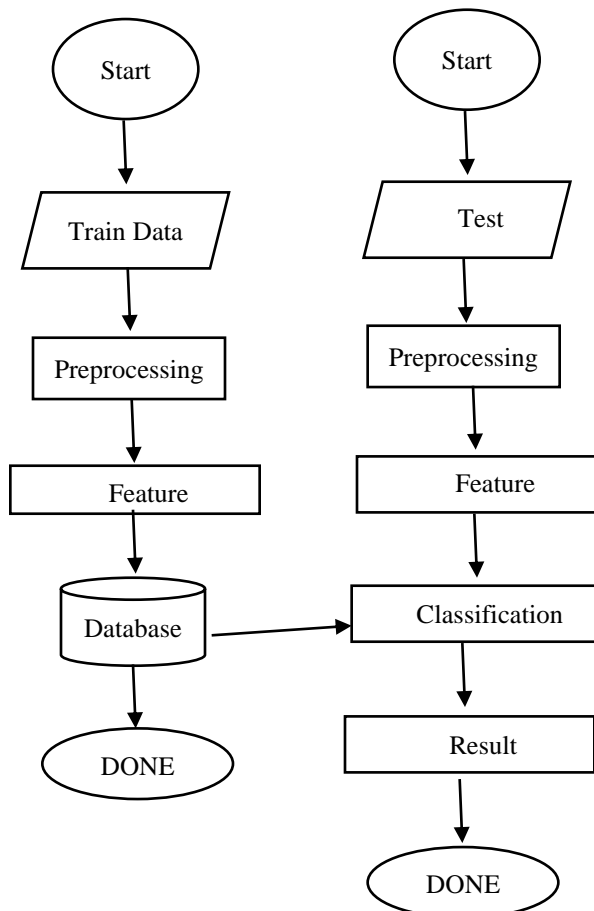
## 2. Flowchart Preprocessing

The preprocessing flowchart is the system flow at the preprocessing stage.






## 3. Flowchat Klasifikasi

After obtaining the results of the feature extraction carried out, these features are used to classify using similarity measurements. The classification process uses the nearest neighbor classification method by calculating the distance between two objects using the Support Vector Machine method.



#### IV. RESULTS AND DISCUSSIONS

In the next test by testing siwalan fruit/comparing manually with the system.

No.	Picture	MANUAL
1		'not enough'
2		'Sweet'
3		'Sweet'

The next manual calculation stage is to calculate the test data in Table 2, which is then classified using Eq.

Test Data							
NO	METRIC	ECCENTRICITY	CONTRAST	CORRELATION	ENERGY	HOMOGENEITY	RESULTS
1	0,261	0,919	0,154	0,877	0,371	0,990	Pretty Sweet
2	0,229	0,964	0,136	0,894	0,009	0,099	not sweet enough
3	0,514	0,740	0,454	0,914	0,097	0,973	Pretty Sweet

#### INTERFACE DESIGN

Discussion of features is a discussion conducted to provide an overview of the main application. The main components in the application are as follows.

##### 1. Classification Form

On the main menu there is a start button which functions to go to the classification form. And only the main menu button on the front page of the application determines the sweetness of the siwalan fruit.



## 2. Data training

From the results of the training data calculations with the SVM training algorithm above, a data database is obtained which will later be compared with the test data calculations.

NO	y	KELAS
1	1,642	Pretty Sweet
2	1,615	Pretty Sweet
3	1,569	Pretty Sweet
4	1.460	Pretty Sweet
5	1,394	Pretty Sweet
6	1,442	Pretty Sweet
7	1,463	Pretty Sweet
8	1,399	Pretty Sweet
9	1,644	Pretty Sweet
10	1,586	Pretty Sweet
11	1,542	Pretty Sweet
12	1,232	Pretty Sweet
13	1,239	Pretty Sweet
14	1,229	Pretty Sweet
15	1,265	Pretty Sweet
16	1,278	Pretty Sweet
17	1,024	Pretty Sweet
18	0.823	Not sweet enough
19	1,076	Pretty Sweet
20	1,192	Pretty Sweet

## 3. Test Results

The experimental data describes the results of the implementation of the program in detail according to the design that has been made. It is necessary to test the program that has been made, whether this program can function properly and can achieve the goals as expected. Testing is carried out using two data, namely training data and testing data. Training data is data that is used as database input and is used as a comparison value. Data testing is another image data that will be tested on the system. The trial results can be explained.

**Conclusion Results**

Event	Function	Expected results	Conclusion
Click the start button on the front page	Displays the main menu of the application	Can enter the main menu of the application	In accordance
Click the image input button on the main menu	Displays the tested image on the main menu	Can display siwalan image on the main menu	In accordance
Click the main menu RGB button	Displays RGB image to the lab on the main menu	Can display the original image results to the lab image	In accordance
Click Shapes and Textures main course	Displays the result of image feature extraction	The feature extraction results appear on the main menu	In accordance
Click SVM main menu	Displays the classification results on the main menu	Classification results appear in the main menu textbox	In accordance

**Calculation of Manual Training Data**

The manual calculation phase is carried out by training the training data with the Support Vector Machine (SVM) algorithm using the following equation

Question:

$$y = w^T xi$$

$$y = (w^T xi) + b$$

From the equation above, a calculation is carried out to find the value, if the value has been calculated, it will change with the following conditions:

If  $y > 0$

$$w^T = w^T lama - \alpha (2 \frac{1}{iterasi} w^T lama).$$

Dan jika  $y < 0$

$$w^T = w^T lama + \alpha (xi.y output) - (2 \frac{1}{iterasi} w^T awal$$

**Discussion of Test Results**

Accuracy is a measure of the accuracy of the system in recognizing the input to be given, so that it can produce the correct output. The accuracy calculated in this test uses the class accuracy of the equation.

$$Accuracy = \frac{Number\ of\ correct\ data}{Number\ of\ data} \times 100\%$$

Information

Number of data: 20

Number of correct data: 18

$$Accuracy = \frac{18}{20} \times 100\% = 90\%$$

**V. CONCLUSIONS AND RECOMMENDATIONS**

Based on the description of the data and experimental results above, it is concluded that:

1. A classification system for siwalan fruit based on color has been successfully created using the svm method
2. The application of the svm method for the community to select fruit produces high accuracy
3. Obtained test results with an accuracy of 90% from 20 test data.

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