

## **CHAPTER 3**

### **RESEARCH METHODOLOGY**

In working on this Project I did the steps, namely:

#### **3.1. Collecting Data**

Researchers collected data in the form of photos taken using smartphone cameras. The photo taken is a photo of a leaf in the yard of the researcher's house. In conducting this study, researchers took as many as 70 samples of leaf photos differently in terms of leaf shape with 40 image colored and 30 binary image.

#### **3.2. Create a Program**

In creating the program, researchers use java programming language by finding source code sources available on the internet, which if the program is the same as the researcher's topic. In the creation of this program researchers use the library of java itself such as buffered image, buffered Image here is used to modify each pixel of the image.

#### **3.3. Testing Programs**

In conducting the test program, researchers began by inserting the selected digital image into the program, after which the colored image was converted into grayscale or gray image, which then the grayscale image results will be input back into threshold and morphological object segmentation program. Threshold is one of the algorithms used to segment the use to separate objects with the background in an image based on the difference in brightness of the image or contrast in the image. While morphological is a topology-based approach and geometric shapes to perform analysis on imagery. For the results of the segmentation will be compared by using mse (Mean Square Error) and PSNR (Peak Signal to Noise Ratio) calculations. MSE is the average squared error value between the original image and the result image, while PSNR is a calculation used to determine the comparison

of the quality of the result image. How to do the comparison here is by calculating with the equation below.

$$MSE = \frac{1}{M \times N} \sum_{i=1}^M \sum_{j=1}^N (f_{i,j} - g_{i,j})^2 \quad PSNR = 10 \log_{10} \left( \frac{C^2 \max}{MSE} \right)$$

M x N is the magnitude of the dimensions of the image.

$F_{i,j}$  is the original image.

$G_{i,j}$  is the result image.

$C^2 \max$  is the largest possible MSE value in two images

