CHAPTER 3
RESEARCH METHODOLOGY

This chapter describes the research methodology in detail to answer one of the questions in the problem formulation sub-chapter. It covers the explanation about research design, data and data source, and instrument of template matching method.

3.1 Research Design

Data sources consist of various kinds of traffic signs in Indonesia. The method of taking data through the results of downloads from Google as many as 500 images. The following is a detailed explanation of the study design process in this study.

3.1.1 Collecting Datasets

Datasets are searched on google with the keyword "traffic signs in Indonesia" then search with various variations of the location of signs on the image. For example, searching for images that containing more than one sign, the proximity of the sign, and the quality of the exposure in the image.

3.1.2 Template Matching Method

There are 6 kinds of template matching methods, here are the details.

A. Sum of Square Differences (or SSD) – CV_TM_SQDIFF:

These are simple Euclidean distance (squared), the principles are, take every pair of pixels and subtract it, square the difference and sum all the squares. The best match is 0, the more the match is, the bigger.

B. SSD Normed – CV_TM_SQDIFF_NORMED

This is rarely used in practice, but the normalization part is where the output from the above methods are divided by a factor, that extracted from the square root of (sum of the

template, squared) and (sum of the image window, squared). The best match is 0, the more the match is, the bigger.

C. Cross Correlation – CV_TM_CCORR

These methods are quite simple. Take every pair of pixels and multiply it and sum all products. The least match is 0, the bigger the match.

D. CCORR Normed – CV_TM_CCORR_NORMED

OpenCV does a division with a standard compilation deviation found in a very different template. The least match is 0, the bigger the match.

E. Cross Coefficient – CV_TM_CCOEFF

Similar to the previous methods, but normalized by their covariance. The best match is 1, the least match is -1, nothing is 0.

F. CCOEFF Normed – CV_TM_CCOEFF_NORMED

OpenCV does a division with a standard compilation deviation found in a very different template. The match is a positive number, the match is a negative number.

For this study, this study using a cross coefficient algorithm and have used the five other algorithm. But other algorithms do not produce output in accordance with the objectives of this study.

3.1.3 Noises

A. Gaussian Blur

In Gaussian Blur operation, the image is convolved with a Gaussian filter instead of the box filter. The Gaussian filter is a low-pass filter that removes the high-frequency components are reduced.

B. Speckle Noise

Speckle noise is typically modelled as multiplicative noise (Rayleigh noise), therefore resultant signal is the product of speckle signal and original noise.

C. Salt and Pepper Noise

Salt-and-pepper noise is a form of noise sometimes seen on images. It is also known as impulse noise. This noise can be caused by sharp and sudden disturbances in the image signal.

3.2 Research Process

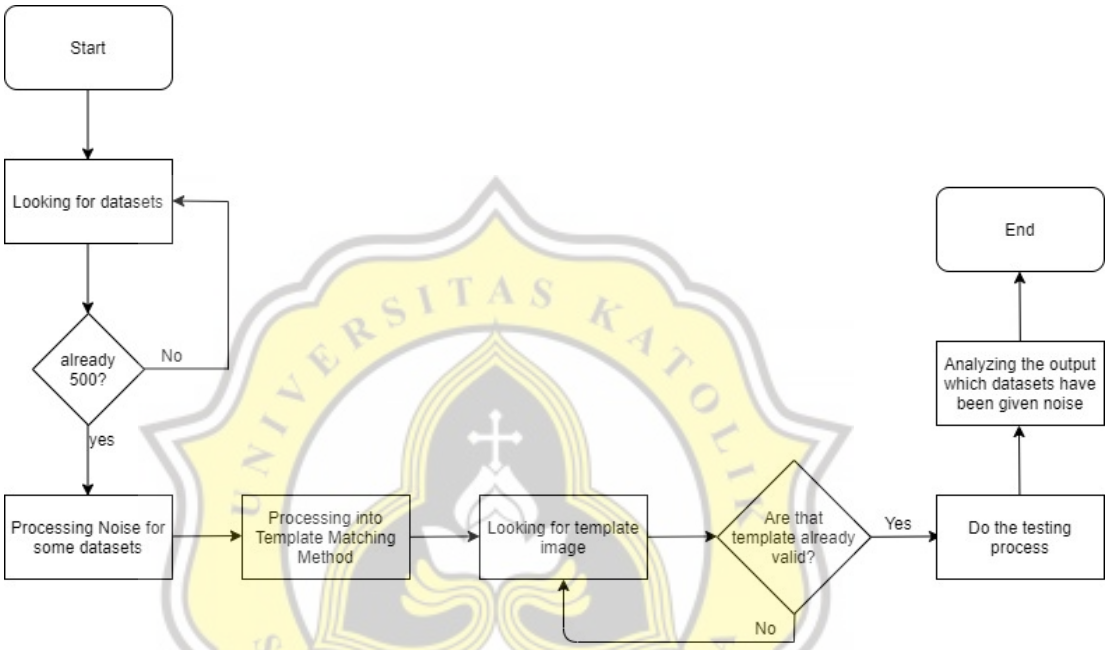

Illustration 3.1: Flowchart of project

The flowchart above is the process carried out in this study. Stage by step needed to be done carefully in order to obtain maximum results. The 500 dataset on this project combined by 4 kind of datasets. 200 of pure image, 100 image with Gaussian blur, 100 image with speckle noise and 100 image with salt and pepper noise. For the template of the images, need an image that having high resolution and resize it into range 45 – 50 pixels.