

CHAPTER 3

RESEARCH METHODOLOGY

3.1. System Design

Figure 3.1 demonstrates the research flow using a flowchart.

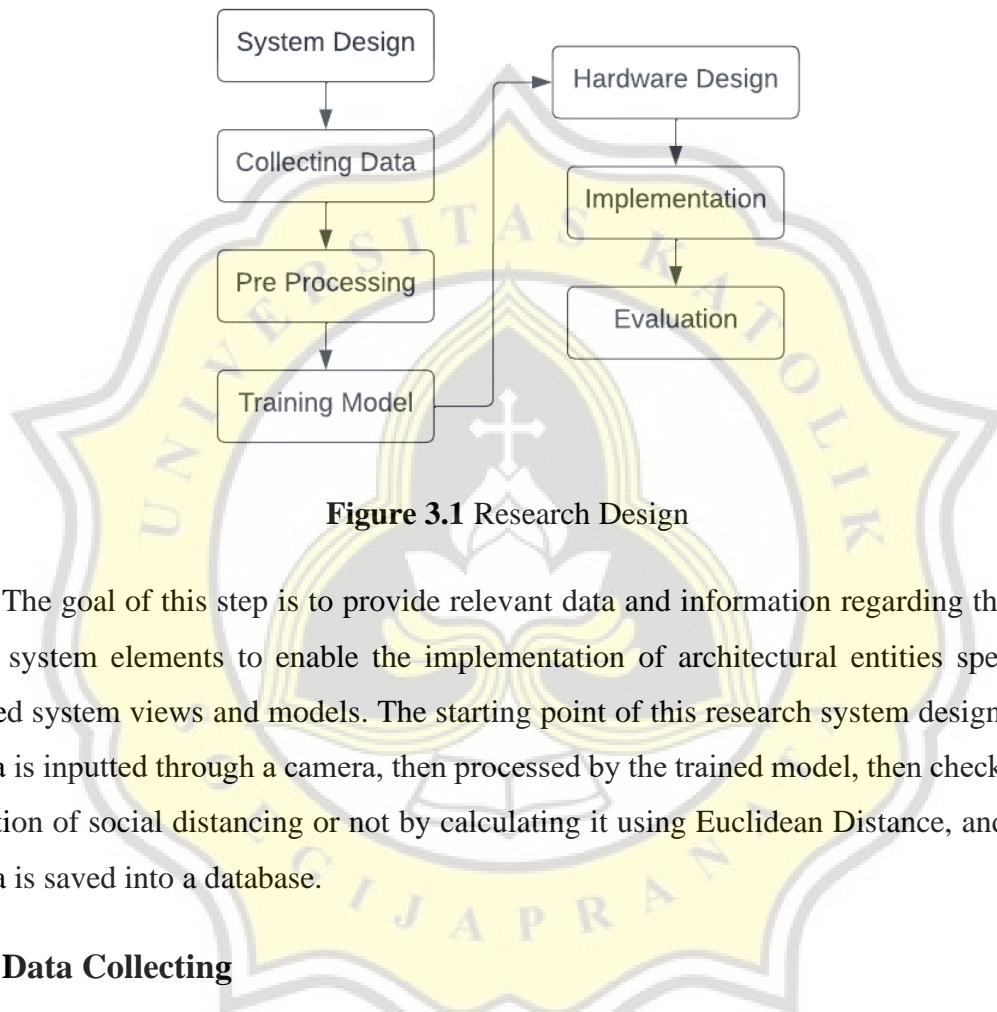


Figure 3.1 Research Design

The goal of this step is to provide relevant data and information regarding the system and its system elements to enable the implementation of architectural entities specified in proposed system views and models. The starting point of this research system design is when the data is inputted through a camera, then processed by the trained model, then checked if it's a violation of social distancing or not by calculating it using Euclidean Distance, and finally, the data is saved into a database.

3.2. Data Collecting

The dataset for this study was taken from the Kaggle website (face-mask-detection by andrewmvd). Images of people's faces covered with masks is contained in the dataset and it is to be used for the artificial intelligence model training data to detect people's faces.

3.3. Pre-processing Data

After the dataset is collected, the next step is to prepare it for the model. The preprocessing steps are labeling the image by marking the area to be the object of detection, then creating a label map to be a reference in the algorithm for classification, since this research

is using Tensorflow, the final step of this stage is to store it in Tensorflow's binary storage format (TFRecord) so the data can take up less space than the original data which significantly affects the model's training time performance.

3.4. Training Model

When the data has been prepared, the model for the detection system is to be trained. The model is using the Single Shot MultiBox Detector (SSD) method which is an algorithm with bounding boxes feature. The SSD method has a high level of accuracy compared to other class methods such as YOLO and RCNN [8]. The model used for this research is a pre-trained SSD model from Tensorflow.

3.5. Hardware Design

The hardware for this research is built of NVIDIA Jetson Nano, cameras, Wifi adapters, and other supporting devices. To run various modern AI loads with amazing performance, an Artificial Intelligence (AI) development kit, which is NVIDIA Jetson Nano, is used. Applications-focused AI frameworks and models such as image recognition, object detection, and segmentation, can be run using NVIDIA Jetson Nano.

3.6. Implementation

The system code is copied and implemented on the hardware system after the software system runs as expected. Some code adjustments are needed in this step to match the existing hardware.

3.7. Evaluation

The model is evaluated to determine the performance of the trained model by computing the precision, recall, and accuracy values. The higher the value, the more accurate the model.