

CHAPTER I:

INTRODUCTION

1.1 Background

Object detection is commonly applied to CCTV for detecting a particular object. In Indonesia, one of the most known usage of CCTV is in toll roads where they can detect vehicles and count them. Jasa Marga operates the CCTV data that is made available for the public (Hardjono, Tjahyadi, et al. 2019). This can give useful information regarding the traffic conditions in that particular area during different hours. This information can in turn be used to find more effective solutions to improve the traffic conditions in that area, which is especially useful given how problematic traffic has become in Jakarta.

This paper will analyze different algorithms to count the number of vehicles in each frame of a video and showcase how accurate each one of them are. YOLO or more specifically YOLOv2 is the object detection system that will be used by the algorithms. The first algorithm is the Simple algorithm that counts any object that is deemed a car or a truck and add it into the counter if it passes the ROI (region of interest), this will then be divided by the total number of frames of the video. The second algorithm, Middle-Frame or Mid-Frame algorithm takes only the total count of the middle frame. The third algorithm, Euclidean Distance uses the Euclidean Distance to measure the difference between each detected vehicle before counting. This allows the algorithm to identify each vehicle. The last algorithm, Lane divides the road into several lanes that it uses to count

vehicles. Both Lane and Euclidean Distance algorithms were first created by Madeleine and Andrew(Hardjono, Rhizma, et al. 2019).

1.2 Formulation of the problem

The formulation of the problem that will be discussed is as follow:

- 1) Which algorithm among all four (Euclidean Distance, Lane, Mid-Frame Simple) is the most accurate at vehicle counting?

1.3 Scope of the problem

The limitations of evaluating the effectiveness in counting the vehicle is as follows:

- 1) Video used is low resolution, 320 x 240 with 5 frames each
- 2) Video takes place at a static point in the Jakarta-Tomang toll road
- 3) YOLOv2 will be used as the base object detection system
- 4) Darkflow is the framework used for YOLOv2
- 5) Uses the pretrained model that was already in YOLOv2, i.e. no additional training data is done
- 6) Vehicle counting only takes place in the two right most lane

1.4 Aim of the Research

The aim of the research is to compare between the four algorithms, which of them will be the most accurate under the previously mentioned limitations. The Euclidean Distance and Lane algorithm will be tested alongside

two newly created algorithms, Mid-Frame and Simple.

1.5 Methodology

In conducting this research, the methods as in the following:

- 1) Conduct study towards the topic and install various programs and software to aid the research
- 2) Create and implement the algorithms and begin test experiment with the given limitations
- 3) Analyze the data received from the test results
- 4) Create a report based on the findings of the results

1.6 Thesis Outline

This thesis report is arranged through the use of systematic writing that explains the following:

CHAPTER I INTRODUCTION

This chapter begins with an explanation regarding the background of “COMPARING ACCURACY OF 4 COUNTING METHODS IN ROI VIA YOLO DETECTION”. The chapter then discusses about the formulation of the problem, limitations and methodologies that are used for this research. At the end of this chapter a thesis outline will provide a brief explanation of each chapter.

CHAPTER II THEORETICAL BASIS

This chapter contains the theories that are referred in writing and developing this thesis. YOLOv2, Darkflow, and various python packages used in this experiment will be discussed as well as the already created Euclidean Distance and Lane algorithm. Finally, this section will contain theories such as traffic density and percentage error that will be used once all the data has already been gathered.

CHAPTER III ANALYSIS AND DESIGN OF SYSTEM

This chapter explains the workflow of Darkflow modified with algorithms for vehicle counting and the training data that will be used. It also contains the pseudocode of the Simple algorithm and Mid-Frame algorithm that will be created. The section will also cover in a bit more detail how the traffic density and percentage error are used in this experiment.

CHAPTER IV TESTING AND IMPLEMENTATION

This chapter discusses the results and the implementation process based on the tests defined from the previous chapter.

CHAPTER V CONCLUSION AND SUGGESTIONS

This chapter will discuss the conclusion and the suggestions used for further studies.

