

CHAPTER I INTRODUCTION

1.1 Background

Artificial Intelligence (AI), which can be translated as Artificial Intelligence or Artificial Intelligence, continues to be an increasingly disruptive technology in various fields, especially banking, finance, entertainment, digital business, and e-commerce. Historically, the terms and concepts of AI in Indonesia have been born since the 1950s, AI has become very popular with a new technique called Machine Learning (ML). However, soon its development slowed down as many ML concepts were difficult to implement practically. In the 2010s, AI returned to popularity with the birth of a new technique called Deep Learning (DL), which is a modernization of ML. Since then, DL has been widely applied to Data Mining (DM), Business Intelligence (BI), and Big Data Analytics (BDA). (Suyanto, 2021).

In the computing science family, we recognize five fields of study: computer science or informatics, software engineering, information systems, computer engineering, and information technology. In the last few years, universities in Indonesia have given birth to a new study program called data science, although it has not officially been included in the computing science family. In 2018, Carnegie Mellon University (CMU), Pittsburg, Pennsylvania, USA, opened an AI study program, the first in the world. Just like data science, AI is not yet officially included in the computing science family. (Kazemi et al., 2013)

Of course, AI has strong relationships with all fields of study in the computing family. In terms, AI is a broad term that covers a variety of techniques for building systems, which can simulate human intelligence including thinking, behavior, and perception in computers. In AI, there are four basic problem solving techniques, namely: searching, reasoning, planning, and learning. The first three techniques are often called classical techniques because they use rule-based deductive concepts, while the fourth technique is classified as modern with data-driven inductive concepts. (Universitas Atma Jaya Yogyakarta et al., n.d.)

Every day, the CCTV system operates to monitor the inside of a building for security. The system's resources allow developers to build computer vision-based applications to integrate with CCTV. Face recognition (FR) is an excellent biometric

technique for identity authentication It is possible to apply FR technology for automatic attendance taking at schools. There are several benefits from attendance considering using the existing camera system, such as save time and effort, provide striking evidence for quality assurance and human resource management tasks, avoid intermediary of infectious diseases (Son et al., 2020)

Talking about security, we all know demonstrations often end in clashes for various reasons, including dissatisfaction, injustice, or tension between demonstration participants and security forces. However, clashes in demonstrations can be prevented through early handling and a wise approach. The Ombudsman emphasized the importance of persuasive efforts and accurate intelligence information for security forces to prevent escalation of clashes during demonstrations. Apart from that, in a legal context, demonstrations are actually protected by Article 28F of the 1945 Constitution, but must comply with applicable laws and regulations. Therefore, early handling of the issues that trigger demonstrations, effective communication between relevant parties, and the use of force as a last resort can help prevent clashes during demonstrations. This is important to ensure that the demonstration can take place peacefully and in accordance with applicable legal provisions.

CCTV which can detect clashes at demonstrations has an important use for monitoring public conditions and providing accurate evidence in handling incidents. One important example is when upholding law and justice. As an example occurred in June 2020, CCTV in the United States was used to provide evidence in an investigation into a person's death, which sparked massive protests. Visual evidence from CCTV helps in understanding the chronology of events and plays a key role in legal proceedings. Thus, the existence of CCTV which is able to detect clashes during demonstrations can help uphold justice and monitor public security.

In Indonesia, such as general elections, demonstrations and conflicts between groups. Several recent political events in Indonesia include the 2019 and 2020 presidential elections, and conflict between groups in Papua.

CCTV can help prevent clashes at demonstrations by providing transparency and better monitoring of the situation. Through CCTV monitoring, security and law enforcement agencies can monitor the development of demonstrations in real-time,

identify potential riots, and respond quickly to prevent conflict escalation. Apart from that, the presence of CCTV can also be a deterrent factor, because demonstration participants are aware that their actions are being monitored and can act as an obstacle to carrying out actions that could trigger clashes. Thus, the use of CCTV can help prevent clashes at demonstrations through careful monitoring and quick response to situations that might cause riots.

Based on that, we plan to conduct research on early prevention by creating an application using AI to detect clashes so that prevention can be carried out early by the authorities.

It is hoped that the results of this research can provide concrete benefits in public security practices. For example, by applying pattern recognition and event detection technology to CCTV, the system can automatically detect suspicious behavior or clashes at demonstrations. This will enable increased security responses quickly and precisely, thereby preventing conflict escalation and minimizing losses. Apart from that, the research results can also help in optimizing the placement of CCTV cameras for more effective monitoring, as well as more efficient data processing through automatic analysis. Thus, the application of the proposed research results can directly increase the effectiveness of the public security system and the efficiency of using CCTV data sources

1.2 Identification of problems

Problem identification is carried out by listing the factors or variables that cause or influence the emergence of the main research problem. Based on this background, the authors identified the problems that became the material for thesis research. These problems include:

1. For security and comfort, an abnormal situation detection system (for example a fight) is needed. This detection system can be used in video surveillance.
2. CCTV sensor systems are generally limited to monitoring capabilities, while detecting and identifying anomalies in crowds must still be supported by an Artificial Intelligence-based sensor system.

1.3 Scope of Problem

Problem limitations are carried out considering the breadth of the problem, feasibility and urgency of the problem as well as limitations in terms of time, costs or researcher capabilities. This study focuses on solving the problems described in the previous sub-chapter by applying problem limitations. Problem limitations include:

1. The main data of this study is open source data from kaggle.com regarding the detection of anomalies in mass crowds.
2. This study analyzes several variables like densities, lighting, and file size.

1.4 Problem Formulation

Based on the research focus explained above, as a reference for describing the research results, the researcher formulated the main problem, namely:

1. How to detect anomaly in mass crowd with deep learning?
2. How to implement the deep learning method on sensor systems on Closed Circuit Television (CCTV)?
3. How to apply deep learning methods to identify anomalies in mass crowds?

1.5 Research Purposes

The research objective shows what the author wants to achieve and why he wants to conduct the research, which includes the targets, aims and general idea of conducting the research. Quantitative research has an important purpose in making measurements which is the center of measurement. This is because the results of measurements can help in seeing the fundamental relationship between empirical observations and the results of data taken quantitatively.

The objectives of this research are as follows:

1. To find out how to detect anomaly in mass crowd with deep learning
2. To find out how to implement the deep learning method on sensor systems on Closed Circuit Television (CCTV)
3. To find out how to apply deep learning methods to identify anomalies in mass crowds.

1.6 Benefits of Research

1.6.1. Theoretical Benefits

Theoretically, this research is expected to produce benefits in order to add and enrich insights in the field of knowledge, concepts, methods, and the development of theories for the development of the study of State Defense Science. By using AI in CCTV, surveillance systems can become more effective because they can detect suspicious events automatically and provide warnings to security officers. This can increase the effectiveness of surveillance and speed up the response of security officers.

1.6.2. Practical Benefits

Practically, this research can increase resource use efficiency. In CCTV, resource use can be more efficient because the system can work automatically and only provide warnings when suspicious events are detected. This can reduce the workload of security officers and save operational costs. Surveillance systems can be more effective because they can detect suspicious events automatically and provide warnings to security officers. This can speed up the response of security officers and reduce the risk of crime.