



# Artificial intelligence (Ai) imaging for enhancement of parking security

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## ABSTRACT

Parking is a public facility found in an agency or office that is used to store vehicles. There are lots of vehicles that can enter the parking area. Therefore, we need an area management and parking system. Artificial Intelligence (AI) is a knowledge that makes computers able to imitate human intelligence so that computers can do things that humans do. This research is motivated by crime cases that often occur in parking lots. This is because there is still a lack of security in the place. The purpose of this study is to increase security and ease of scanning on motorcycle license plates to get parking tickets automatically and face scans. That way, if a crime occurs in the monitoring area, the camera can easily recognize the face of the perpetrator, which makes the incident process easy.

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## 1. Introduction

In the digital era of 5.0, technology is increasingly improving. Technology is something that is needed by humans. This can be proven by the emergence of various applications and programs. Among them are the fields of services, health, finance, education, and transportation. With these applications and programs, humans can more easily carry out their activities and can maximize their work [1].

Transportation is one thing that is very important for human life. Based on data released by bps.go.id there was an increase in passenger cars by 10.54 million

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units, an increase of 11% from the previous year of 9.524 million units. This increase has an impact on the need for a wider parking area [2].

The increase in the number of private vehicles makes people have to be responsible and ensure the safety of their vehicles. Therefore, vehicle owners need to find a parking space that is comfortable and secure. In addition, most of the current parking systems only record the time of entry, exit, and the length of time the vehicle is in the parking lot. This certainly makes motorists feel at a loss, because time will be wasted looking for a parking space.

Along with the development of technology in this modern era, a lot of technologies are developing, one of which is Artificial Intelligence (AI). Artificial Intelligence is the ability of digital computers or computer controlled robots to solve problems that are normally associated with the higher intellectual processing capabilities of humans [3]. Artificial Intelligence is considered to be experiencing very rapid development. Its utilization almost meets all areas of life. Examples of tools that utilize AI are robots, expert systems, and computer vision (such as face recognition). The increasing utilization of AI in various services makes robots as preferred intelligent agent model, so AI and robots are growing rapidly all over the world [4].

Face recognition is a technology used to identify and recognize human faces through a digital process. Computers can recognize and distinguish human faces through the photos they get. This technology has been widely implemented in computers, smartphones, robots, and so on. Face recognition has been implemented in various services such as e-voting, e-commerce, and services (such as parking systems and security systems). This technology can save time and money. In the parking lot itself, face recognition and image processing can increase the security of the parking lot. Surveillance cameras or CCTV that is integrated with the license plate detection system are also used to minimize vehicle misuse [5]. OCR (Optical Character Recognition) functions to read images and then construct them in text form [6].

On this basis, the authors try to make breakthroughs to overcome this by utilizing Artificial Intelligence and OCR. The paper entitled "Artificial Intelligence (AI) Imaging to Improve Parking Lot Security" is expected to be able to improve parking lot security and reduce crime.

## **2. Method**

Method Judging from the type of data, the research approach used in this study is qualitative approach. Research with a qualitative approach, namely research that aims to understand what phenomena are experienced by research subjects holistically and through descriptions in the form of words and language in specific natural contexts and utilizing various scientific methods.

According to Burhan Bungin "the data collection method is in what way and how the necessary data is obtained so that the final results of the study can present valid and reliable information." In writing this paper, the author uses the literature study

method to find relevant sources and reading materials to support the existing data. Articles and journals that are used as references can make research results stronger and produce research that is valid and has an impact on the wider community [7]. These sources come from articles and internet journals that are relevant and selected [8].

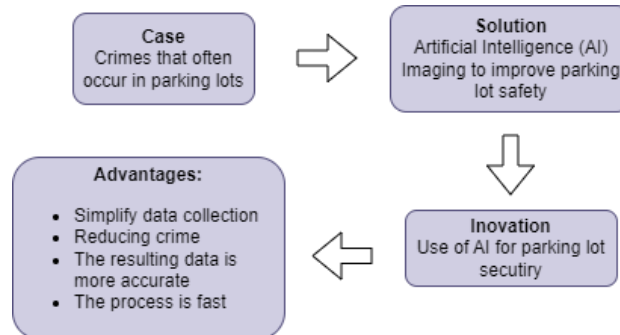


Figure 1. Thinking framework

### 3. Results and Discussion

Artificial Intelligence or artificial intelligence is a computer system that can perform activities that normally require human intelligence. This technology makes decisions by analyzing and using the data available on the system. At present, there are many uses of Artificial Intelligence in our daily lives. With Artificial Intelligence, humans can complete their work more easily and quickly. For example, such as increasing the security of parking lots based on Artificial Intelligence. The current parking security system is still very vulnerable to crime and searching for parking spaces with an on-the-spot system. A manual system like this will slow down the speed, thus creating congestion around the parking lot [9]. Utilization of Artificial Intelligence in this case is used to detect license plates and faces simultaneously so that it can facilitate data collection and recognition of the driver's face.

#### 3.1. Benefits of Using AI to Improve Venue Security Parking

At present, crimes often occur in parking lots, such as theft. This is due to the lack of a level of security in the parking lot. Therefore, it is necessary to increase the security system in the parking lot. With this AI, when a person is monitored within the range of CCTV, the AI will automatically work to scan the person's face and recognize the identity, so that when a crime or theft of the perpetrator's face occurs it will be easy to track. In addition to scanning faces, AI also works to scan vehicle license plates, making it easier to collect data and get accurate results. A high level of accuracy can minimize errors in data input. AI can study large amounts of data, making it easier to collect data to save time and reduce queues. In addition, with the presence of AI, it will be easy to monitor 24 hours, in contrast to humans, which can only be up to 12 hours maximum, so the use of AI certainly saves more on human resources.

#### 3.2. How to Use AI to Improve Venue Security Parking

Artificial Intelligence or artificial intelligence is currently growing rapidly and is widely used in everyday life, one of which is to improve parking security systems. This system utilizes the existing cameras on CCTV that have been programmed so that they can scan automatically and identify.



Figure 2. Stages of the OCR algorithm

Figure 2 shows the stages of the OCR algorithm process. With this, the vehicle license plate data will be converted into text form. Vehicle license plate data is stored in the form of data in a database that is used by officers to monitor vehicle data in real-time [10]. This system works using image processing techniques and OCR algorithms, as follows.

1. **Input data.** In this system, vehicle data is captured by a camera installed in the parking lot area, then the data is stored in a database to see the type, color of the vehicle, number plate, and owner. After that, the license plate data is entered manually and compared again when leaving the parking lot [11].
2. **Image Processing.** Where the input data will be recorded by the camera and then entered manually. Furthermore, each image object will be converted into a frame shape. In this system, what is taken is input data from the number plate. Image processing techniques will automatically recognize license plates. Image processing is used to process license plates as well as image and color sharpening.
3. **OCR Algorithm.** The OCR algorithm process is the process of converting images into text. This algorithm has a high level of accuracy and is widely used, especially in the field of transportation.
4. **Visual marking.** Visual marking is a marking method for vehicles that have passed the parking lot which is done automatically by the system. This system is particularly useful in very large parking lots [1].

The stages of the process are as follows.

- a. Tacking pictures of vehicle number plates by CCTV when the vehicle first enters.



Figure 3. The process of taking pictures of license plates

- b. The initialization process and the process of reading vehicle number plates. Then in the next stage, the process of segmentation and image sharpening is carried out.

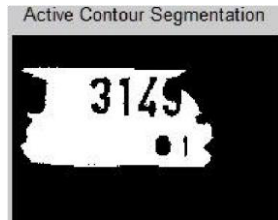


Figure 4. The process of initializing and reading license plates

- c. After the image segmentation process is carried out where the shape of the vehicle plate has begun to be read, the image sharpening process will be carried out.

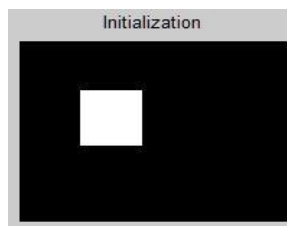


Figure 5. Image sharpening process

- d. Next is the process of reading the OCR algorithm on the number plate, the data from the text is converted into binary and adjusted to the similarity of the shape of the text being read.



Figure 6. The process of reading the OCR algorithm on license plates

- e. Finally, the OCR algorithm reading output will appear as follows.

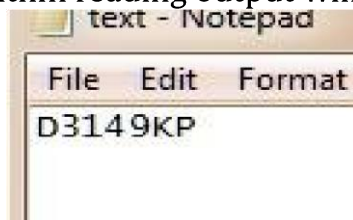


Figure 7. OCR algorithm reading output

#### 4. Conclusion

Based on the results of the description above, it can be concluded that AI-based parking can reduce crime, make it easier for us to collect data, and have a high level of accuracy. This system utilizes CCTV cameras that have been programmed so that

they can simultaneously scan faces or license plates in the parking lot and retrieve data when the vehicle first enters. A parking space system using OCR and image processing can provide additional security features and vehicle data entering the parking area, where the path number will be converted into text or numbers. However, in the world of technology nothing is as perfect as this AI technology. For example, when using it, errors often occur and the price is relatively expensive. The price is quite expensive, so this AI is still rarely used. We as the younger generation must continue to develop technology in any field. The goal is clear to make it easier to carry out activities and advance the nation's economy.

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