



Master Proposal Title:

Developing deep neural networks and convolution neural networks with Artificial intelligent TensorFlow algorithms for a smart detection system

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Abstract

The series of crimes in the community, the list of complexes and residential buildings is still a constant concern for residents, even with the presence of security services in buildings and surveillance cameras. Still, the perpetrators of crimes find loopholes and ways to penetrate the security services, and for this, people feel fear for their valuable property. Vehicle crimes are considered one of the highest crime rates, as on the one hand, the crimes of vehicle theft, and on the other hand, they are used as a means of committing crimes and robberies. Criminals take advantage of security loopholes that security men cannot quickly detect or arrest before the crime occurs. For example, when a forged car license plate is placed for the car, and the security man is deceived and registered at the residence's gate as a visitor, the security man then cannot detect the criminal at that time. The project's goal is to fill the loopholes that criminals exploit in placing a fake license plate in the car so that the specifications of cars such as the license plate, car logo, type of vehicle and color car are identified and detected. Then, match these car specifications with the data of the owners of the cars to determine the actual owner of the car. Using advanced technology such as deep neural networks and machine learning algorithms such as MobileNet SSD model to predict the vehicles and determine the type of vehicle, and using YOLOv4 to detect licences plates and cars logos, also, applying TensorFlow Lite to predict the colour of the car.

Introduction

The project system design is to detect the specifications of the cars in terms of detection on vehicle type, cars colors, the license plate number of the vehicle, and the detection of the car brands logo. The vehicle specification data is analysed, and the valid owner of the car is determined. So that every vehicle is licensed in any country. Its information is recorded from the registration number of the vehicle's license and the manufacturer of this vehicle, and its color, model, and type of vehicle. These types are for cars, and there are also types of vehicles such as cars or trucks, buses, motorcycles, etc.

Each country has their operating system and the method for issuing vehicle licenses. All these legal procedures must be documented with the state to allow the issuance of a permit for vehicle owners and the use of licensed vehicles inside the country officially and legally. The project focuses on one type of vehicle, which is cars only, and on four important specifications for the cars that I explained earlier, the car number plate, the logos, vehicle type, and cars colors. Because the most important specifications for cars that are difficult to be forged or tampered with by criminals and car thieves are changing the car number plate, installing a fake car number plate, or changing the car manufacturer's logo.

On the other hand, the technology developers focus to reduced vehicles crimes by developing cars system security to protect owners of cars from vehicle thieves. Nowadays, modern vehicles with becoming high-security systems. But in fact, cars that blew up are used by criminals as a means to commit crimes. For that reason, forgery of some car specifications, such as changing license plate numbers on a forged license plate, is the easiest way to deceive the security guards at the residence gate. Then the criminals were able to penetrate the security hole that the security guards in the entrance could not detect because they do not have a system to detect cars that carry Forged license plates.

Problem Statement

At the guardhouse, criminal always exploits the security apparatus loopholes through the use of fake id and fake car plate numbers to enter the residence easily to do theft or murder, without earlier detection from the security guards.

Aims and Objectives:

Building a program that works within the security systems of a residential building in easy to use and fast manner and operates automatically to analyse and detect vehicle data.

The main objectives of this research are as follow:

- 1) Design a smart system for detecting possible pre-crime action under the surveillance of video camera.
- 2) Develop a deep learning-based algorithm identification of car specifications that are mismatched to the car owner.

Literature review

The PerpSearch [1] system conducts the initial geographical survey on a specified area search based on officer-selected criteria (such as designated areas) [1]. PerpSearch [1] aggregates their home addresses with linked or nearly related persons [1] in the second phase. The final step applies biometric filtering methods to narrow the search region for the offender. Then it compares the physically suspicious people's physical structure (length and breadth), facial shape, and skin color. The last phase applies a crime pattern component to accurately assess criminals based on their criminal history [1]. Past crime data is utilized to generate the patterns that impact the offender rating. For example, a person with a history of robbery or burglary offences is more likely to conduct robbery again

Another literature review research. The project through applies CNN to predicts the crime using surveillance cameras (CCTV) by detecting the crime tools, knife, pistols and blood by analysing the images captured by the monitoring cameras using an artificial intelligence system, which facilitates the monitoring process of security services [2].

Due to scientific and technical advancements, there are several techniques to identify crimes, and the crime rate has been reduced due to this advancement. And one of the methods for detecting crimes that were employed was Data mining and social network analysis are two examples of information technology that have been frequently employed in law enforcement to solve crimes. According to recent studies, regional profiling is also helpful in aiding criminal investigations [1]. PerpSearch [1] is an integrated system that takes a criminal description as information, such as the location, type, and physical description of suspects (personal traits or vehicles) [1]. The technology will use four linked components to discover suspects: geographic profiling, social network analysis, crime trends, and physical matching [1]. Another system makes manual security guard monitoring easier by alerting the system when CCTV detects a dispute or an intruder [3]. When an incident happens, the system utilizes sound signal processing to detect violence and picture processing to detect an intruder, then notifies and sends a signal to the system administrator

Result

After finishing implementing the project methodology for the detection specifications car process, the project system should be succeed in recognizing and detecting all specifications of the cars required to help us discover the crimes that accrue inside residences.

Conclusion

The project system should detect all specifications through applying artificial intelligence technology to the Deep neural network and Convolution neural modules network by using deep learning and machine learning algorithms and several models such as MobileNet SSD for detect the vehicles and identify the categories of type vehicle with high-performance accuracy rate.

References

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- [2] Mohammad Nakib, Md. Sakibul Hasan, Rozin Tanvir Khan, Jia Uddin "Crime Scene Prediction by Detecting Threatening Objects Using Convolutional Neural Network" 2018 20th September, 2018 International Conference on Computer, Communication, Chemical, Material and Electronic Engineering (IC4ME2).
- [3] Pattana Intani , Teerapong Orachon , " Crime warning system using image and sound processing" 2013 9th January , 2013 13th International Conference on Control, Automation and Systems (ICCAS 2013).