

Artificial Intelligence in Surveillance Camera

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Abstract: Artificial intelligence have played a great role in our daily life. AI have now been implemented in almost all the fields nowadays. It's been decade since AI have taken over the cyber world. AI have been implemented traffic cameras to sense the violation of traffic of rules. The functionality of these camera is very limited. Many other nations have implemented these technologies according to their specification so that they can customize according to their need. These technologies have their own advantages and disadvantages. We need to calibrate these advantages so that we can use this AI technology. Recent incidents in India by applying these cameras have given many errors in the camera, that's because it has not implemented in the correct manner. We need technologies that are specifically designed to match the conditions. Suppose if it is raining then we need to calibrate these cameras according to those conditions. The applications of the AI cameras and its uses are discussed.

Keywords: Surveillance Camera, Traffic Camera, Public Cameras, Artificial Intelligence, etc.

I. INTRODUCTION

The growth of the digital camera market can be said to have begun in the late 1990s and early 2000s. Till date surveillance cameras have played a greater role in our daily life. we need high speed high accuracy cameras to capture these footages and analyse it using Artificial Intelligence. So, for that we use smart cameras(sensors). We also need high speed storage for storing these footages captured using these AI cameras. When compared to cameras without AI there are lots of advantages for AI cameras such as preventing theft, avoid violation of traffic rules etc.

All the developing countries have now implemented surveillance cameras in all traffic signals. AI cameras can be used in public places to capture footages of any kind of crimes and can give alarm to the operators at real time so that they can avoid that crime before it gets more complicated. These types of cameras have played a great role in our daily life. AI CCTV cameras are network IP cameras that deliver advanced analytical functions like vehicle detection, face detection, person detection, people counting, traffic counting and license plate recognition (LPR). Advanced video analytics software is built into the camera and recorder, which then enables artificial intelligence functions.

II. GENERAL ASSUMPTION AND SYSTEM ARCHITECTURE

In order to use the visuals, we need high speed, high accuracy cameras in traffic signals, called Smart Camera. Only those footages can be correctly analysed using AI. A smart camera (censored camera) is a machine vision system which, in addition to image capture circuitry, is capable of extracting application specific information from the captured of extracting application specific information from the captured images, along with generating event descriptions or making decisions that are used in an intelligent and automated system. We also need high speed storage for storing these visuals.

How Does It Work?

For AI CCTV camera to work, data is constantly sent to a recorder and Processed via an AI layer to make sense of the raw video. Rule-based AI cameras are manually set up with rules and reference image such as humans in different postures, angles or movements. The AI will then ask itself if anything it observes looks and moves like this.

Depending on the rules set, such as ‘no one is allowed in this area at a certain time’ if the camera observes this, it will send an alert. Some of these systems are self-learning, like those which use “behavioural analytics” software. With this technology, the AI analyses normal behaviour for the area and gradually builds up a definition of this typical behaviour, including the size, speed and colour of particular object. It then normalizes the data, tagging any object and patterns it observes. When something the AI sees falls outside of this typical behaviour, it alerts security professionals.

III. ARTIFICIAL INTELLIGENCE

While there have been several definitions of artificial intelligence (AI) throughout the years, John McCarthy gives the following explanation in this 2004 study “It is the art and science of creating intelligent devices, particularly intelligent computer programmers. It's akin to the problem of utilizing computers to study human intellect, but AI doesn't have to be limited to physiologically observable ways.”

However, a long time earlier than this definition, the birth of the synthetic brain dialog used to be denoted by means of Alan Turing's seminal work, "Computing Machinery and Intelligence", which was once published in 1950. In this paper, Turing, often referred to as the "father of computer science", asks the following question, "Can machines think?" From there, he affords a test, now famously regarded as the "Turing Test", the place a human interrogator would try to distinguish between a pc and human text response. While this test has gone through a good deal scrutiny seeing that it publishes, it stays a necessary section of the records of AI as nicely as an ongoing notion inside philosophy as it utilizes ideas round linguistics.

IV. TRAFFIC CAMERAS

AI CCTV cameras are network informatics cameras that provides totally different analytical functions like face detection, vehicle detection, person detection, License Plate Recognitions (LPR). Advanced analytical functions are engineered into the cameras and recorders, which then checks those captured videos using these computing functions. For the AI cameras to figure they provided data at the same time to the recorder and analyze it using an AI layer. Rule-based AI cameras are supplied with some set of rules and reference pictures of individuals in several angles postures and movements and supported these set of rules it analyses the captured videos. The AI can then raise itself if something it observes appearance and moves like this. supported the principles set provided, like ‘no one is allowed during this space at an explicit time,’ if the camera observes this, it'll send alert to the individual operators.

Some of these systems square measure self-learning, like those that use “behavioral analytics” code. With this technology, the AI analyzes traditional behavior for the world and bit by bit builds up a definition of this typical behavior, together with the scale, speed and color of explicit objects. It then normalizes the info, tagging any objects and patterns it observes. once one thing the AI sees falls outside of this typical behavior, it alerts security professionals.

V. ARTIFICIAL INTELLIGENCE CCTV CAMERA IN PUBLIC PLACES

In both public and private places, CCTV cameras have long been utilized as deterrents to criminal activity or to diminish the fear of crime. However, many older CCTV systems can only help to solve a crime after it has occurred, which is often too late.



Figure 1: AI CCTV

AI CCTV, like traditional CCTV cameras, records data so that any occurrences may be examined. AI CCTV, on the other hand, can identify and deliver alarms in real time. This implies that operators can send out mobile response units to deal with a situation as it happens. These systems can also allow object tracking, in which a red rectangle appears on the screen and follows the detected threat automatically. Some cameras additionally include a two-way audio system, allowing operators to communicate with anyone in the surrounding.

VI. THE ACCURACY OF ARTIFICIAL INTELLIGENCE SURVEILLANCE

AI CCTV cameras are far more accurate than ordinary CCTV cameras because they eliminate human error. This significantly minimizes the number of false alarms and hence the system's operational expenses.

The view of a typical camera in a public location may be blocked by weather, such as rain or fog, or by actual objects. Any potential security problems may be difficult to notice for the individual observing the video. The AI CCTV camera, on the other hand, can look impartially at all of the cameras in the region at the same time and compare them to the millions of reference photos it analyses to detect an intruder or threat more quickly.

Temporary AI CCTV towers are common in private locations like as building sites, where work is done for a set period of time. However, AI CCTV may be used in public spaces to monitor crowds, such as during sporting events. AI CCTV cameras are far more accurate than ordinary CCTV cameras because they eliminate human error. This significantly minimizes the number of false alarms and hence the system's operational expenses.

VII. WHAT IS NEXT FOR PUBLIC SPACE SURVEILLANCE?

AI CCTV cameras have shown however the security industry is consistently developing with the assistance of latest technologies. Other options found in new CCTV camera systems are thermal cameras, solar-powered cameras and people with options like time-lapse and heat/fire detection.

In one thing such as Tom Cruise's *Minority Report*, some police forces within the United Kingdom have been trailing a system that can predict if someone is trying to commit a criminal offense in order that they will stop it before it happens. The system, that is that the initial of its kind, uses over a computer memory unit of knowledge from native and national police databases, together with records of antecedental stopped and searched folks and their criminal records. The police found nearly 1400 indicators that might be useful to predict crime. What happens once people are detected is debated, however support from social services has been offered as a possible answer.



Figure 2: AI Cameras in Public Surveillance

VIII. ADVANTAGES OF ARTIFICIAL INTELLIGENCE CAMERA

A. Reduction in Human Errors

One of the biggest advantages of AI cameras is that it can reduce human errors and increase accuracy and precision. For example, while using cameras without AI the operators have to sit and watch the screens to find if there is any kind of crimes are occurred or not. While in AI cameras we are able to get alerts in real time when any kind of crimes occur because AI cameras are rule-based systems.

B. 24x7 Availability

Humans cannot work for 24 hrs. a day. They also need breaks to balance their work life and personal life. But AI can work endlessly without any breaks.

C. Unbiased Decisions

Human beings are driven with the aid of emotions, whether or not we like it or not. AI on the different hand, is devoid of feelings and extraordinarily practical and rational in its approach. For example, AI cameras does not change its rules for people in higher positions, while humans sometimes let the people free for what they have done, i.e., there is no partiality for AI cameras between higher people and ordinary people.

D. Accident Detection

AI cameras are able to detected accidents at real time and they can give alert to operators. The vehicle detection system is built through surveillance cameras and accident detection occurs due to collisions between any two objects on any road at any time.

E. Theft Control

AI cameras can detect movements of people based on the rule sets and if it captures any kind of malpractice or anyone is trying to steal anything then at real time it provides an alert to the operators and they can stop the crime at immediate action.

F. Fast Object Detection

Objects can be recognized using AI surveillance cameras faster when compared to cameras without AI. For example, if we want to find a car, we can just search its number plate and it's that simple and also we can get information's about that car like where exactly now the car is etc. While in cameras without AI we need to check each and every video and its time consuming and also there is a chance of missing while searching.

G. Maintaining Traffic Rules

The AI cameras are given with a rule set for the traffic rules and based on that the AI cameras check whether all are following the rules without any errors. Checking errors like if everyone is wearing helmets, seat belts or not etc.

IX. DISADVANTAGES OF ARTIFICIAL INTELLIGENCE CAMERA

A. Not Correctly Implemented

In many nations we have correctly working AI Cameras but all these cameras are not working on the same principles or algorithm. They have all have been customised according to their usability. In a nation like India, we need specific rules and algorithm to implement AI Cameras. India has a very high rate of rules violation, so in that case we need high precision cameras to detect multiple violation at the same time. For that we need very high technology to implement it in our country.

B. Unemployability

Unemployability is one of the main concerns of the people of the nation. So, in that case if we are implementing such technology, we should also be concerned about the unemployability of the nation too.

C. Chances of occurring error are very high

As of now if we are using AI Camera with current traffic rules the chanced of occurring the errors are very high, because we have a very complicated traffic rule. With those rules applying machine learning along with Artificial intelligence is very complicated.

X. CONCLUSION

The Applications of AI Cameras are very vast we have to use it very intelligently and efficiently to get its maximum output. There are some disadvantages in this system which can overcome and make AI very useful in our daily life. The Future of these technology is very advanced like AI cameras for the detections of crimes before it happens. Likewise, we can make it our future.

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