



The significance of Artificial Intelligence and Big data in remodelling the security and surveillance of smart cities

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ABSTRACT

As the definition of Big Data says “gigantic data sets examined computationally to generate patterns, trends, and associations, especially **relating to human behavior and interactions**.” So, with this we understand that human behavior analysis is a major factor of Big data and so is Artificial Intelligence. Thus, AI and Big data are inseparable components of the new revolutionary computer science.

The answer to the question that how “**AI is so close to the real world**” is big data. The huge data set fed to the machine makes it more self-functional or what we say makes machine learning possible. The ultimate goal of Artificial Intelligence is **machine learning and deep learning** which is fulfilled by big data. AI then generates new patterns and procedures as output and gets smarter day by day. The relationship between AI and Big data is directly proportional that is the more we feed data, the more AI gets better making it a perfect **humanoid**.

It is now very much obvious human are no doubt coherent in scanning and distilling large amount of low visual level objects and sending an illustrative delusion to the brain, but in the recent years due to the initiation of artificial intelligence (AI), it has been made possible for the computers to differentiate between objects and interpret them accordingly with the help of **AI and big data analysis**.

Keywords: Artificial intelligence, Big Data, UAV, Surveillance tools, IOT

1. Introduction

In the recent years much more of surveillances have been deployed all over the public places due to security reasons and also due to the rising crime rate over the past years, surveillance was extensively reliant on human as one has to detect one's behavior and determine whether person under surveillance is suspect or just a sightseer. The efficiency was very low as there were too many screens to keep track of it. It can be overcome with help of Artificial intelligence where all data are fed into the system in the form of algorithms, if there is any suspect then the computer observes his or her movement and behavior and raises an alarm so that the officials get notified about it.

These types of implementations have brought rapid decline in the crime rates. According to a study, in San Francisco, the department of police were not able to control violence within city as most of the violence ended up in gunfire as many had lost their life because the police were not precise in locating the location of gunfire and also number of rounds shots, in order to combat this shot-putter sensors were used this in turn reduced the crime rate drastically.

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AI has found its roots into many of the military applications where unmanned drones which are used for high-risk missions, for surveillance where human intervention is not required as the coordinates of particular location under surveillance are loaded onto the on-board systems, from there on artificial intelligence takes over.

1.1 Future of AI and Big Data in Security and Surveillance

In the future it may help in simulating tactical warfare so that the infantry is well prepared, best example of AI in being implemented in warfare is the use of unmanned aerial vehicles where there is an on-board system which takes care of the entire aerial vehicles the only role of board and also the AI enabled weapon system is quite advanced where decision making system is quite similar to UAV where it also eliminates human intervention, in the worst case if the AI augmented weapons are unable to make their own decisions, the infantries that employ AI will always have an upper hand in the battle field. Countries use Artificial Intelligence as a technology to execute an extensive range of surveillance goals. The three main primary AI **Surveillance tools** as incorporated by AIGS index are smart city project/safe city platforms, facial recognition systems through AI and smart policing. the human user is to just feed the data onto the system and the rest will be taken care by the artificial intelligent system on

It also describes about the recent happening technologies such as **cloud computing** and **Internet of Things (IOT) networks** which are integral part for AI surveillance. More importantly, AI **surveillance tools** are not just a standalone instrument for repression. They an integral part of a variety of digital repression tools such as information and communications technologies which are used to survey, intimidate and harass opponents in order to inflict a penalty on a target.

1.2 Unmanned Aerial Vehicle (UAV)

Over the past few decades, unmanned aerial vehicles (UAVs) are an alternative solution/platform, which create the safest working environments to humans from risky areas or covert missions.



Fig 1

With the new feature of remotely real-time surveillance, UAVs incorporated with cameras can capture live images or videos or can track targets such as specific areas, people or vehicles. In recent times, UAV surveillance has been upgraded with latest features like self- controlling, hovering, analysis and data processing by integrating UAVs with artificial intelligence (AI). Using AI, UAVs can be tested to perform stipulated tasks by processing large chunks of live images and videos and simultaneously pin pointing the present region. In addition to above features, AI technology is also used in improving the limitations of UAV surveillance systems like storage capacity, processing and analyzing capability, transmission bandwidth, which in turn helps in transmitting data continuously and thereby reducing computational cost and increase the accuracy. Artificial intelligence (AI) is one of those branches of Computer Science which usually deals with creation of intelligent machines, which can think and function like humans. To intelligently solve present day cyber security issues like intrusion detection and prevention system.

2. AI and Big Data in developing smart cities

By 2050 the security and development has risen up to 90%. Technology is the only way to deal with the expected increase in pollution. The Smart City is always focused on the seamless integration of information and Communication. Technology with the most cutting-edge technological breakthroughs, such as well-connected houses and equipment. Smart cities improve citizens quality of life by offering efficient infrastructure and increase security.

Surveillance is a repetitive and tedious task that, when carried out for an extended period of time, degrades the performance of human guards. Because of its increase in the control of epidemics such as COVID-19, edge computation via the 5G wireless connectivity network can be managed effectively.

The use of a hierarchical edge computing system provides numerous benefits, including low latency, scalability, and the protection of application and training model data, allowing COVID-19 to be evaluated by a dependable local edge server. Furthermore, many deep learning (DL) algorithms suffer from two critical flaws: First, training necessitates a large COVID-19 dataset comprised of various aspects, which will present difficulties for local governments. Second, in order to be acknowledged, the findings of deep learning necessitate ethical considerations and other contributions for surveillance. Obtaining surveillance videos is required for public and industrial security. Overwhelming progress has been made in computer vision fields to automate surveillance systems in terms of human activity recognition, such as behavior analysis and violence detection. However, it is difficult to detect

and analyze violent scenes intelligently in order to fulfill the concept of Industrial Internet of Things (IIOT)-based surveillance buoyed by limited resources to reduce computational power. To address this challenge, an AI-enabled IIOT-based framework with VD-Network (VD-Net) is proposed. The input video frames are first of all fed into a light-weight deep neural network.

3. Investiture of AI in smart city development

The induction of AI applications into urban areas for developing smart cities by inclusion of sensors and Big Data with Internet of Things (IoT). With the incorporation of these in the design and management of urban areas helps in bringing new changes which can contribute to the urban development. Technical advancement in sensors, cameras and robotics are useful as security instruments and later on their greater use can be found in protection of house, factories and public places. This security equipment identifies the faces and biometrics of the people in house and workplaces by using their high-resolution cameras and built in AI. AI has the ability to learn, act and think by utilizing the information they acquire. It has the capability of identifying and isolating the risks immediately and also to give instant response strategy. The applications of AI can be found in the security management of information, prediction of breaches etc.



Fig 2

4. Application of smart cities with AI and Big Data in picture

The applications not only include remote controlling home appliances but also detect pre-earthquakes. Smart cities do offer a wide range of applications. A smart city can be classified into few domains such as Smart surveillance, Smart Monitoring, Smart Transportation, Smart Health, Smart Infrastructure, Smart energy.

All these applications also include sub applications. Smart surveillances include smart monitoring of schools. Smart Transportation includes Subway systems, Smart traffic automation, Smart cities. Smart health includes smart health monitoring devices and smart hospitals. Smart infrastructure includes smart buildings, smart waste management and smart houses.

5. Conclusion

Security and privacy no doubt are a real concern for smart city applications. The services offered by smart cities are directly relatable to the lifestyle of people. Any type of disturbance due to fault in security might be dangerous. Traditional security management strategies are insufficient due to the large amount of heterogeneous data and thus service management is a prodigious task.

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