Artificial Intelligence Applications and new Transformations in the Concept of Community Security and Peace: A Foresight Sociological Perspective

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Abstract :

Artificial Intelligence (AI) has become a pervasive force in all aspects of life, influencing even the smallest details of our daily routines, as evidenced by its integration into smartphones. This research paper aims to explore the role of AI in fostering a secure and stable social environment by leveraging its applications and systems in various fields, most notably traffic safety and cybersecurity. Additionally, the paper examines how AI algorithms can predict social issues well before they occur, providing sufficient time for relevant authorities to prevent and address these problems by tracking a range of indicators.

Keywords: artificial intelligence; security; peace ; society**.**

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1. The Introduction

The convergence of mathematics and computer science has driven the development and maturation of artificial intelligence (AI) algorithms, sparking a monumental revolution in the digital world. This convergence has led to a qualitative leap and a radical transformation across various fields, profoundly influencing the behaviours of individuals and communities. Today's individual is, above all, digital, utilising AI in the smallest details of daily life through smartphones. These devices now store aspects of our personal lives, which are sometimes exploited for blackmail, fraud, and other forms of deviant and criminal behaviour.

This reality has spurred incentives and encouragement to intensify efforts in developing and deploying AI applications and systems in the fight against crime and deviance, aiming to achieve peace and security in society. AI contributes to aiding and assisting security agencies in reducing crime rates at all stages—from predicting criminal activities to identifying perpetrators and providing evidence to relevant authorities for criminal prosecution.

In this research paper, we explore how AI is harnessed to maintain peace and security in society at various stages. We focus on presenting real-world examples in the fields of traffic safety, cybersecurity, and criminal justice, as well as the key challenges faced in these areas.

2. The Concept of Artificial Intelligence:

In the realm of computer science, artificial intelligence (AI) is defined as the branch concerned with replicating intelligent behaviors within computer systems. It refers to machines' capacity to imitate human cognitive functions. (Abdel Aziz & Hassan, 2023, p. 8)

According to the Oxford Dictionary, AI encompasses "the theory and development of computer systems capable of executing tasks that typically demand human intelligence, like perception, speech

recognition, decision-making, and language translation.".Britannica Encyclopedia describes AI as a field enabling machines to exhibit human-like intelligence or mimic intelligent human actions. (Abdel Aziz & Hassan, 2023, p. 8)

In technical terms, AI is also defined as a science aimed at understanding the nature of human intelligence and creating computer programs capable of mimicking human cognitive abilities, particularly learning, reasoning, and reacting. These programs are integrated into non-living entities such as machines and equipment, enabling them to perform tasks and functions similar to those of humans autonomously, without prior human intervention. (Awadin & Tahafa, July 2020, p. 669)

Artificial Intelligence (AI), also known as simulating human intelligence, achieves this by developing technological techniques capable of intelligently performing human tasks using probability and logic based on provided data. (Salama & Elsherif, 2021, p. 343)

Another definition describes AI as a field dedicated to understanding human intelligence by creating specialised applications that mimic intelligent human behaviour. These technologies think, infer, provide solutions, and can even predict the future. (Salama & Elsherif, 2021, p. 343)

Others define AI as "the field of computer science concerned with developing systems that possess characteristics associated with human intelligence and the ability to make decisions in a manner somewhat similar to human behavior across various domains."**.** (Arnous, 2007, p. 9)

From our perspective, we define artificial intelligence as the science that seeks to understand and replicate human natural intelligence,

reproducing it in the form of programs, applications, machines, and equipment with significant capabilities in analysis, reasoning, prediction, and performing tasks traditionally reserved for humans.

Based on the definitions provided, we conclude that AI offers numerous features and advantages, including speed, efficiency, accuracy, and precision in analysis. It also enables the detection of crimes before they occur and reduces human errors during investigations, such as bias or negligence.

3. The dimensions of Artificial Intelligence in achieving security in Society:

Artificial Intelligence (AI) systems have ushered in a new era, with the Kingdom of Saudi Arabia leading the way through its visionary **Vision 2030**. The Kingdom has established national programs aimed at achieving information security, cybersecurity, and traffic safety. These objectives are realised through processes such as sensing, pattern recognition, inference, analysis, and perception, all supported by the vast databases stored within AI systems. Additionally, the security and stability of societies are maintained through AI-powered systems and applications that monitor communications and analyse activities across various social media platforms.

The provision of peace and security in society is further enhanced through autonomous systems, which play a critical role in performing both hazardous and non-hazardous tasks without endangering human lives. Examples include cleaning and decontaminating polluted areas, as well as using robots for bomb disposal and defusal. AI systems are also employed in lifting fingerprints from crime scenes and even reconstructing the scenes themselves.

Most autonomous systems, particularly those focused on security, have integrated AI technologies into their operations to enhance performance and efficiency. These systems are designed to handle

cognitively complex tasks, as well as repetitive, dangerous, or hazardous duties across various fields. By doing so, they reduce risks to human lives and lower long-term operational costs. (Hassan, 2020, p. 4)

Among the most notable features of artificial intelligence (AI) applications are their speed and precision in performing tasks. These systems surpass human capabilities in understanding events and controlling them effectively.

Additionally, AI systems offer significant benefits in long-term tasks that exceed human endurance. For example, they excelin gathering intelligence across vast areas over extended periods and detecting anomalies with remarkable accuracy. (Hassan, Artificial Intelligence and Its Security Dimensions, 2018, p. 5)

4. Applications of Artificial Intelligence in Traffic Safety and Cybersecurity:

In light of the social and economic transformations sweeping the globe, cities have become more complex and densely populated. This has necessitated the development of solutions to traffic problems, prompting studies to explore the potential of artificial intelligence (AI) systems to enhance the quality of social life for individuals and create innovative solutions for organising and processing traffic-related data. These systems enable informed decision-making to facilitate smoother traffic flow.

Through highly advanced statistical algorithms, AI systems can analyze real-time data, contributing to reducing congestion, enhancing vehicle safety measures, and simplifying parking management. By directing drivers to available parking spaces, these systems reduce the

time spent searching for parking, thereby alleviating traffic congestion, lowering fuel consumption, and minimising environmental pollution.

AI is widely adopted in traffic safety due to its effectiveness in automatically detecting violations and utilizing surveillance cameras on main and secondary roads. This facilitates smoother traffic flow and helps avoid traffic jams, which claim millions of lives annually.

AI-powered devices provide continuous, precise, and uninterrupted monitoring as programmed. This reduces errors and ensures services are available 24/7 without the need for breaks. Such systems can be applied to road surveillance, accurately recording and identifying traffic accidents, and instantly notifying security and ambulance vehicles to provide timely first aid.

The availability of data has enabled the adoption of AI technologies and tools in security operations at both national and regional levels. These applications range from managing routine tasks such as traffic regulation and violation monitoring to more advanced mechanisms like surveillance, tracking, predictive analysis, and various policing activities . (Hassan, Artificial Intelligence and Its Security Dimensions, 2018, p. 11)

are difficult to identify or understand. For instance, AI assists in conducting experiments multiple times using computers and advanced technology, revealing hidden aspects of reality and identifying recurring patterns that might be challenging to detect in real-world scenarios.

As an example, when Florida was struck by a hurricane, one of its most significant impacts was the inability of fuel stations along highways leading north out of the state to provide sufficient fuel. This paralysed traffic flow and made evacuation efforts more chaotic and difficult. Initially, some assumed the issue was caused by a fuel

shortage. However, AI simulations revealed that the root cause was power outages at the fuel stations, which prevented them from operating their fuel pumps. This incident led to the establishment of new regulations requiring fuel stations along evacuation routes to install fuel-powered generators to ensure the operation of pumps during emergencies. This case can serve as a model for addressing various security and emergency scenarios. (Hassan, Artificial Intelligence and Its Security Dimensions, 2018, p. 13)

In conclusion, AI systems and applications can:

Identify potential congestion points.

Manage and proactively redirect traffic flow.

Divert traffic.

Detect and predict potential risks and accidents on roads.

It is worth noting that Dubai, in the United Arab Emirates, has integrated AI systems into policing and criminal investigations. These systems are used to predict crimes, collect forensic evidence, manage traffic, and handle crises and disasters. Dubai Police also employs a smart application that can issue search and arrest warrants within 10 minutes through the public prosecution office. Additionally, Dubai has introduced "robot police" or "automated police officers" to conduct surveillance patrols in public parks, shopping centers, and other urban areas. Given the UAE's growing interest in advanced AI systems, the country has appointed a Minister of State for Artificial Intelligence.

In the field of cybersecurity, which is one of the most threatened areas due to vulnerabilities arising from its use, AI systems are increasingly being adopted to enhance data and information protection. However, cybersecurity still faces challenges in ensuring privacy and security. Examples of cybercrimes include electronic fraud, disruption of systems and electronic services, drone attacks, and the use of social media platforms to spread rumours and mislead public opinion

5. Artificial Intelligence in Criminal Security

Artificial intelligence (AI) systems and applications contribute significantly to achieving criminal justice by providing vast capabilities and extensive data in the field of criminal investigations. They possess the ability to analyze and infer complex patterns that may be difficult for investigators to uncover, often requiring considerable time and effort. Examples of such data include: (Arjamand, Areeba, Basit, & Subha, 2024)

Fingerprint Analysis: AI is used to identify fingerprints quickly and accurately from large datasets. It can also assist experts in analyzing unclear or distorted fingerprints.

DNA Analysis: AI can efficiently compare DNA samples with extensive databases and help experts identify patterns and connections between different DNA samples.

Digital Data Analysis: AI can extract data from electronic devices such as smartphones and computers. It can also analyze digital data to search for forensic evidence, including images, videos, and text messages.

Gunshot Audio Analysis: AI can analyze gunshot sounds recorded by phones and smart devices using well-defined mathematical models. It can distinguish between types of gunfire based on the firearm used, determine the timing of shots, identify the number of firearms involved, and count the number of rounds fired.. (Awwa, 2022, p. 115)

AI also enables us to predict the likelihood of crimes before they occur, aiding in their prevention. Since crime is dynamic and evolves with technology, the methods of combating crime must also adapt and evolve in line with societal realities.

Moreover, AI has been introduced into the judicial field to streamline and simplify legal procedures and litigation through what is known as **electronic litigation** and **smart litigation**. Smart litigation relies on simulating human reasoning and making judicial decisions without the

need for a judge's intervention. AI systems can assist in resolving cases independently or support judges in making decisions, effectively acting as an expert or assistant in the judicial process.

6. Predicting Crimes with Artificial Intelligence:

AI applications provide the capability to combat crime by predicting it before it occurs. The term crime prediction emerged in the 20th century in Anglophone countries, closely tied to the concept of intelligence. Its emergence coincided with the massive technological revolution these countries experienced, alongside the rise and diversification of modern crimes, particularly electronic and cybercrimes.

Similarly, American countries were not immune to the changes and developments occurring in Europe, nor to the rise in crime. They, too, adopted the concept of crime prediction when governments were compelled, through crime legislation, to allocate significant budgets to leverage technological advancements in predicting and combating crime.

However, modern technology has condensed all these methods into AI applications capable of detecting crimes likely to occur in the future, providing sufficient time for authorities to prevent them. The idea of algorithmic crime prediction can be traced back to the American novelist Philip K. Dick, whose works were predominantly science fiction. One of his most notable works is the novel "The Minority Report," published in 1956 in the magazine Fantastic Universe. The story revolves around the ability of three individuals to predict crimes before they occur, referred to as the "Precrime" police. (Salama & Elsherif, 2021, p. 342)

Artificial intelligence (AI) serves the function of organizing and structuring security operations, analyzing and processing data and information, and conducting investigations within digital data repositories and information systems. It operates based on predefined mechanisms and technologies tailored to its security applications, ultimately providing recommendations to support accurate and precise decision-making. By delivering actionable insights to security agencies, AI enhances their ability to make informed decisions. The more advanced the technological tools, the more effective the decisions and outcomes produced by AI, thereby contributing to crime prevention and control.

It is important to note that AI systems cannot predict crimes without specialized algorithms designed for this purpose. Crime prediction using AI programs can be described as algorithmic crime prediction. Algorithms are the tools AI systems use to predict crimes by applying statistical concepts, pattern recognition, big data analysis, and data correlation to generate results. (Salama & Elsherif, 2021, p. 343)

Experiments have demonstrated that these technologies provide significant services and contribute to combating crimes while reducing the time and effort humans expend on searching, analyzing, and investigating evidence. For instance, in the United States, the use of predictive policing systems in Los Angeles police departments in 2014 led to a **21%** reduction in violent crimes and a 33% decrease in thefts. Similarly, in the United Kingdom, predictive policing technology contributed to a 26% reduction in crime rates in 2011. Among the AI technologies that can be used for crime prediction, we will discuss the following elements in detail. (bin Saud, 2022)

6.1 Leveraging Big Data Analysis

Electronic data and digital evidence of crimes are not easy to eliminate; their traces remain no matter how hard criminals attempt to erase or destroy them. Official security agencies, particularly in the field of crime prevention, work to link crime-fighting efforts with the vast databases provided by artificial intelligence (AI), effectively

turning them into search engines (so to speak) for digital evidence and clues related to committed crimes.

This process begins with receiving a report of a criminal incident, which can be submitted electronically or through applications specifically designed by security agencies for reporting purposes. These applications are regularly updated to keep pace with developments in the field. The second stage involves verifying the accuracy of the report or complaint to avoid false or malicious reports. Once the report is confirmed, the investigation phase begins, focusing on gathering evidence related to both the report and the suspects. Data and information are collected, followed by the stage of correlating the data, mining, analysing, and compiling evidence, all of which are examined by AI. This allows criminal cases to be processed in record time compared to traditional human-led procedures.

6.2 Digital Forensics: Bridging Crime Investigation and Technology

This process involves the integration of forensic science, computer science, and networks through devices, networks, the Internet of Things (IoT), and digital media. It results in the generation of digital evidence for criminal incidents. In this process, all available data from law enforcement agencies is utilized, such as lists of suspects, terrorists, or individuals reported in other cases, as well as data from health and social sectors. The goal of digital forensic analysis is to preserve, identify, obtain, and document digital evidence for use in courts. (bin Saud, 2022)

6.3 Decision-Making Techniques:

This is a model that enhances AI's ability to make critical decisions and optimally handle ambiguous situations in a short and

standardised time frame. It achieves this by analysing intensive computational processes derived from previous scenarios and their outcomes, enabling the delivery of better and more accurate decisions while minimising errors. This process is known as the **Markov process**, a stochastic control process with discrete time used to model decision-making in optimisation problems under uncertainty. Several applications assist AI in decision-making, including expert systems and neural networks. These applications excel at processing data and signals, providing technical solutions based on past experiences, and combining technical and human expertise in one framework. This integration enhances the quality of decisions made by AI and allows for the monitoring of output quality. Additionally, it enables the prediction of potential changes in various fields. (bin Saud, 2022)

It is worth noting that there are examples in China of developing and innovating technologies designed to predict and prevent crimes. These include facial recognition technologies and suspect analysis, as well as crowd analysis techniques to detect suspicious patterns and track individuals with prior criminal records.

AI systems also provide benefits in long-term tasks that exceed human capacity, such as gathering intelligence across vast areas over extended periods and detecting anomalies.

Most police departments in developed countries have embraced the idea of using AI applications to predict future crimes. Researchers continue to refine these applications, which are expected to have a significant impact on reducing various types of crimes. One of the most prominent and widely recognised applications is PredPol, which identifies high-risk areas—or "hot spots"—where crimes are likely to occur. It also predicts potential offenders by analysing vast amounts of data, images, videos, and other information, such as a suspect's social media activity, credit history, internet usage, health status, neighbourhood information, and criminal record. These data points enable the application to provide indicators that help determine the

likelihood of an individual committing a specific crime. Additionally, PredPol sends predictive maps to police patrols via tablets, along with hints and notifications about the probability, nature, and timing of potential crimes. (Salama & Elsherif, 2021, p. 348)

7. Memory Imprint: A Breakthrough in Crime Detection and Criminal Identification:

One of the pioneering programs that has revolutionised the world of crime is **Memory Fingerprint**, a smart analysis device equipped with highly advanced applications designed to measure brainwave activity to identify offenders. Its operation is closely tied to psychology and neuroscience, as individuals' memories store and retain events, details, and life experiences. When these memories are recalled, the brain is stimulated and emits waves as a result of involuntarily retrieving these events.

The brain is the primary source responsible for all human actions, including planning, execution, and recording events, such as those related to a crime. The actual perpetrator of a crime stores the details of the crime in their memory. **Brain fingerprinting** is a method of reading the electrical signals emitted by the brain in response to viewing certain images or information related to a crime.

This technology is not designed for use during interrogations, as it does not require any questions or answers. Instead, it objectively detects whether specific information is present in the suspect’s mind, regardless of whether their statements are true or false. The brain, in this case, serves as an infallible witness. (Ruslan Al-Hani, 2013, p. 87)

Brain fingerprinting relies on a wave that mimics deep secondary memory in humans, which is responsible for storing historical information. This technology works by retrieving such memories

through the presentation of questions, statements, or television scenes. The responses are then analyzed using computer systems to determine the extent of an individual's knowledge about other suspects. This process occurs spontaneously and cannot be controlled by the individual. It is important to note that this system differs from lie detection technologies, and its margin of error is extremely low. (Al-Aseimi)

After the process of collecting data from the crime scene, the tools and means used in committing the crime are presented, or images of the crime scene and any other elements related to the circumstances of the crime are displayed. The device then provides a precise analysis of the extent to which these tools are present in the criminal's memory.
This technology has been tested to assess its success and effectiveness by experts in criminal psychology on numerous criminal cases over the years. Through these tests, they have been able to refine and apply it with a high degree of expertise in certain criminal cases, yielding remarkable results.
Brain fingerprinting facilitates and streamlines criminal investigations, particularly in cases of homicide where it is difficult to reach the victim or to prove the crime against them. This technology aids in uncovering critical evidence that might otherwise remain hidden.Challenges Faced by Artificial Intelligence Systems in Ensuring **Social Security** and Peace.

8. Challenges Faced by Artificial Intelligence Systems in Ensuring Security and Peace in Society

One of the challenges faced by nations in utilising artificial intelligence systems and applications to ensure security and peace within society is the commercial nature of these systems.Legislation and laws can present a significant challenge, if not an outright obstacle, when it comes to collecting data and information about individuals and communities that prioritise privacy. For example, in

domestic criminal cases, if evidence is captured on a surveillance camera inside a private residence, accessing and analysing its content may require lengthy legal procedures. In another instance, involving a cross-border crime, if the evidence of a crime lies in the information from an account on a social media platform, the privacy policies of these platforms often prevent sharing the account holder's information with security authorities. Exceptions are typically made only for specific crimes, such as terrorism, online child exploitation, and organised crime as defined by the Vienna Convention. These legal and privacy considerations can significantly impact the efficiency and effectiveness of criminal investigations. (Hassan, Artificial Intelligence and Its Security Dimensions, 2020, p. 12)

Accountability: It is crucial to determine who is responsible for errors that may be committed by artificial intelligence. It remains unclear who would be held accountable for any mistakes or damages resulting from the use of AI systems in criminal investigations.

Bias: It is essential to ensure that AI systems are not biased against specific groups of people. These systems must be fair and equitable for everyone.

Transparency and Accountability of AI Systems: Understanding how intelligent models make decisions and reach conclusions can be challenging, raising concerns about transparency and accountability.

Economic Threats: The use of AI technologies will impact the quality and quantity of job opportunities available, as many tasks traditionally performed by humans may be replaced by AI-driven robots. This shift could lead to significant economic and social disruptions.

9. The conclusion:

With the advancement of artificial intelligence technology, it is likely that we will see an increase in its applications in the fight against crime and corruption, which have affected all sectors. However, it is also probable that we will witness the emergence of new types of crimes that were previously unknown. As crime-fighting tools evolve, so do the techniques used to commit crimes.

Therefore, from this standpoint, we propose a set of recommendations:

Activate and update research and support specialised research in artificial intelligence systems.

Develop human resources by introducing academic disciplines focused on artificial intelligence in universities, colleges, and institutes, with an emphasis on practical applications.

Conduct more specialised research in the field of crime prediction and decision-making in the realm of societal security.

Encourage investment and provide incentives in the field of artificial intelligence systems.

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