Leveraging AI in the Criminal Justice System through Its Application in Criminology

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ABSTRACT

The integration of Artificial Intelligence (AI) into the criminal justice system presents transformative opportunities, especially when applied within the framework of criminological theories. By utilizing AI tools such as predictive analytics, machine learning, and natural language processing, criminologists and law enforcement agencies can enhance decision-making, risk assessments, and resource allocation. AI's ability to analyse vast datasets allows for the identification of criminal patterns, behavioural predictions, and the development of more targeted crime prevention strategies. This aligns with the Positivist School of Criminology*, which emphasizes understanding the underlying causes of criminal behaviour through scientific methods and data analysis. Furthermore, AI can automate routine tasks such as case file management and forensic analysis, improving efficiency and reducing human bias, resonating with the* Classical School*'s focus on rational decision-making and the deterrence of crime through predictable outcomes. However, the application of AI in criminology is not without ethical concerns. Issues such as algorithmic bias, privacy violations, and the reinforcement of existing inequalities challenge the efficacy and fairness of AI systems. These concerns intersect with the* Critical Criminology *perspective, which critiques the power dynamics and social inequalities inherent in the justice system. This abstract examines the dual-edged nature of AI in criminology, exploring both the promising benefits and the ethical challenges posed by its use, with a focus on ensuring that AI contributes positively to a more just and equitable criminal justice system.*

Key words – *AI (Artificial Intelligence), Criminology, Criminal Justice System, Human Rights, Schools of Criminology*

INTRODUCTION

Artificial Intelligence (AI) is being utilized increasingly across various sectors, and its potential to revolutionize the criminal justice system is becoming more apparent. The application of AI in criminology—through technologies such as predictive analytics, machine learning, and natural language processing[1]—holds the promise of enhancing the efficiency and fairness of

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[1] Situmeang, S., Harliyanto, R., Zulkarnain, P., Mahdi, U. & Nugroho, T., 2024. The role of artificial intelligence in criminal justice. *Global International Journal of Innovative Research*, 2(8), pp. 1966–1981. https://doi.org/10.59613/global.v2i8.264 [Accessed 24 December 2024].

criminal justice operations. However, it is essential to understand these technologies within the context of criminological theories, particularly those from the Classical, Positivist, and Critical schools, as each provides a distinct perspective on AI's application within the justice system.

Prominent criminologists like Edwin Sutherland and Donald Cressy define criminology as the study of crime as a social phenomenon, focusing on the processes of law-making, lawbreaking, and society's responses to these violations. The aim of criminology is to establish principles and knowledge related to crime, law enforcement, and the treatment of offenders. One of the primary roles of criminology is crime detection, and with the emergence of AI, this process has become more efficient. While the role of AI is still evolving, it is already having a significant impact in multiple international jurisdictions. Thus, criminology encompasses the examination of crime detection, the criminals involved, and the broader criminal justice system.

In early societies and the medieval period, human thought was dominated by religious mysticism, with myths, superstitions, and religious beliefs shaping social relationships. As a result, there was little focus on the psychological, environmental, or motivational factors behind crime. Consequently, punishments were often arbitrary and inconsistent due to the lack of a formal system or guiding principles for criminal justice. This situation persisted until the late 17th century when a shift in societal thinking led reformers to concentrate on understanding the causes of crime, marking the beginning of criminology as a formal field of study.

The development of criminology as a discipline is often attributed to the Italian scholar Cesare Beccaria (1738-1794), who is regarded as the father of modern criminology. Beccaria's ground breaking work introduced a scientific approach to understanding crime, laying the groundwork for developing crime-control methods. As criminology evolved, various schools of thought emerged, each providing different explanations for the causes of crime. According to Sutherland, a "school of criminology" is a comprehensive system of thought that connects a theory of crime causation to specific policies for crime control.

Each school proposes unique understandings of crime and recommends corresponding methods of punishment and prevention shaped by the prevailing social attitudes of the time. As the scientific study of crime and criminal behaviour, criminology has long been influenced by these schools of thought, all of which attempt to identify the causes of crime and propose solutions for crime control. This article aims to explore how AI can be integrated into criminology and assess both the potential and challenges it presents in transforming the criminal justice system. The intersection of AI and criminology offers promising strategies for crime prevention while also raising complex ethical concerns.

AI and Criminology: The Intersection[2]

Criminology, as a field of study, has evolved significantly over the years. Traditionally, criminologists sought to understand the nature, causes, and effects of crime through various theoretical frameworks. These frameworks, ranging from biological theories to sociological and psychological explanations, aimed to answer critical questions about why individuals engage in criminal behaviour and how societies should respond. Early criminological thought largely focused on philosophical debates, seeking moral and ethical understandings of crime.

In recent decades, however, criminology has embraced a more empirical, data-driven approach to studying crime. This shift is largely due to the integration of advanced technologies, particularly Artificial Intelligence (AI), into criminological research and practice. AI, with its ability to process large datasets at unprecedented speeds, has significantly altered how criminologists analyse crime patterns and predict future trends.

AI provides criminologists with the tools to analyse vast amounts of data from multiple sources, such as crime reports, social media, surveillance footage, and even environmental data. By applying machine learning algorithms, AI can identify patterns in crime that may not be immediately apparent through traditional methods of analysis. This technological advancement enables criminologists to detect emerging trends, improve crime forecasting, and develop evidence-based policies.

A prime example of AI in criminology is **predictive policing**.[3] This method uses AI algorithms to analyse past crime data and identify potential hotspots where crimes are likely to occur in the future. By examining variables such as time of day, location, and the type of crime committed, predictive policing tools can provide law enforcement agencies with data-driven insights into where to allocate resources most effectively. This proactive approach helps law enforcement respond to crime in a timely manner, potentially preventing incidents before they happen.

Furthermore, **machine learning**—a subset of AI—has made significant strides in risk assessment and offender rehabilitation. Machine learning is most closely associated with the

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[2] Bibi, S. & Raza, F., 2023. Exploring the intersection of criminal laws and technological advances: Challenges and implications. *ResearchGate*. Available at: https://www.researchgate.net/publication/371470716_Exploring_the_Intersection_of_Criminal_Laws_and_Technological_Advances_Challenges_and_Implications [Accessed 24 December 2024].

[3] RAND Corporation, 2013. *Predictive policing: The role of crime forecasting in law enforcement operations*. [online] Available at: https://www.rand.org/pubs/research_reports/RR233.html [Accessed 24 December 2024].

positivist school of criminology,[4] particularly because of its reliance on empirical data, statistics, and the use of algorithms to understand and predict criminal behaviour. The positivist school of thought emphasizes the use of scientific methods, including empirical data collection, to study crime and criminal behaviour. It focuses on finding causes of criminal behaviour that can be measured objectively. Positivist criminology aligns with machine learning because both rely heavily on data analysis and the search for patterns. In criminology, positivists might use machine learning algorithms to identify trends in criminal behaviour, socio-economic factors, or the effectiveness of criminal justice interventions. This approach seeks to predict and explain crime using data, similar to how machine learning uses algorithms to learn from data.

Thus, machine learning models can predict the likelihood of an individual reoffending, based on historical data such as their criminal record, behaviour, and other socio-demographic factors. This predictive capability assists in making informed decisions regarding parole eligibility, sentencing, and rehabilitation strategies, aiming to reduce recidivism rates and improve the fairness of the justice system.

The fusion of AI and criminological theories creates a dynamic synergy that enhances the field's ability to understand crime on a deeper level. While criminological theories traditionally focused on understanding the "why" behind criminal behaviour, AI's empirical, data-driven approach allows researchers to explore the "how"—how crime occurs in certain patterns, how specific factors contribute to criminal activity, and how social structures influence crime rates. For instance, **social control theories**, which focus on the ways society attempts to prevent deviance, can be enriched with AI data to examine the effectiveness of various policing strategies or community interventions. Hirschi (1969) began his theory with the view that asking why offenders "do it" when it comes to crime and delinquency is, on its face, an irrelevant question. Instead, we should be asking, "why don't we do it?"[5] **Strain theory**,[6] which posits that crime results from individuals' inability to achieve societal goals through legitimate means, can be tested and refined using data on economic conditions, education levels, and access to resources in different communities.

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[4] Tappen, S., 2018. Criminological theory – early positivism. *Sandra Tappen*. Available at: https://sandratrappen.com/2018/06/25/criminological-theory-lombroso-positivism/ [Accessed 24 December 2024].

[5] SAGE, 2023. *Key Idea: Hirschi's Social Bond/Social Control Theory*. [online] Available at: https://us.sagepub.com/sites/default/files/upm-binaries/36812_5.pdf [Accessed 24 December 2024].

[6] Thompson, K., 2023. *Merton's Strain Theory of Deviance*. [online] Available at: https://revisesociology.com/2016/04/16/mertons-strain-theory-deviance/#:~:text=In%20short%2C%20Merton%20argued%20that,these%20goals%20was%20through%20crim [Accessed 24 December 2024].

Through this integration, criminologists can not only refine existing theories but also develop new insights into criminal behaviour that were previously difficult to quantify. AI enables a more holistic view of crime by incorporating diverse datasets and providing real-time, actionable information.

While the integration of AI into criminology holds promise, it also brings significant ethical and social challenges. The use of AI in criminal justice, particularly in areas like predictive policing and risk assessments, raises concerns about bias and fairness. Machine learning models are trained on historical data, and if that data reflects existing biases in the criminal justice system—such as racial disparities in arrests and convictions—the AI algorithms may perpetuate or even exacerbate these biases. For example, predictive policing tools that rely on past arrest data may unfairly target certain neighbourhoods or racial groups, leading to over-policing in these areas.

There is also the issue of transparency. Many AI systems used in criminology are considered "black boxes," meaning that the decision-making process of the algorithms is not fully understood, even by the developers who created them. This lack of transparency can undermine public trust in the justice system, as individuals may be subjected to decisions that are influenced by algorithms they cannot scrutinize or challenge.

Furthermore, the privacy of individuals is another concern. AI-powered surveillance systems, such as facial recognition technologies, raise questions about the extent to which society is willing to sacrifice personal privacy for the sake of security. Ensuring that AI is used responsibly in criminology requires strong ethical guidelines, clear accountability structures, and public oversight to ensure that justice is served without infringing on civil liberties.

As AI technology continues to advance, its potential applications in criminology are vast. From crime prevention to rehabilitation, AI can transform the way societies understand and address criminal behavior. For instance, AI could be used to personalize rehabilitation programs for offenders, matching them with specific interventions based on their likelihood to reoffend, mental health needs, or social conditions. It could also be applied to community crime prevention initiatives, using data to identify at-risk youth and offering targeted support before they turn to crime.

However, the future of AI in criminology will depend on how society addresses the ethical, legal, and social challenges it introduces. Policymakers, criminologists, and technologists will need to collaborate to develop guidelines and frameworks that ensure AI is used in a way that is both effective and just. Ensuring that AI systems are transparent, accountable, and free from bias will be critical to their success in the field of criminology.

The intersection of AI and criminology represents a promising frontier in the study of crime and justice. By combining traditional criminological theories with the power of AI, criminologists can gain new insights into criminal behaviour, improve crime prevention strategies, and create more equitable systems of justice. However, as with any technological advancement, it is crucial to remain vigilant about the potential ethical and social implications of AI in criminology. With careful oversight and thoughtful implementation, AI can play a pivotal role in shaping the future of criminology and the criminal justice system as a whole.

Schools of Criminology and AI Integration

The application of **Artificial Intelligence (AI)** in criminology is not merely a technological shift; it intersects with foundational criminological theories that explore the causes of crime and the ways in which crime is detected, prosecuted, and prevented. AI, especially in its capacity to predict criminal behaviour, automate investigations, and optimize resource allocation, brings new opportunities and challenges to various schools of criminology. Each criminological theory offers a unique lens through which to evaluate the benefits and potential pitfalls of AI in the criminal justice system.

1. Classical Criminology and AI

Classical criminology, founded in the Enlightenment period by theorists such as **Cesare Beccaria** and **Jeremy Bentham**, posits that crime is the result of rational decision-making by individuals who weigh the consequences of their actions. According to this view, if the costs of committing a crime outweigh the benefits, individuals will choose not to engage in criminal behaviour. Classical criminology advocates for a system of law that ensures punishment is swift, certain, and proportional to the crime, thereby deterring individuals from offending.

AI's role in **predictive policing** aligns closely with classical criminology's belief in deterrence. This data-driven approach helps law enforcement agencies deploy resources to high-risk areas, ideally preventing crimes before they happen. The proactive allocation of police forces can serve as a deterrent, reinforcing the classical idea that visible consequences (i.e., the presence of police officers) prevent crime by increasing the perceived risk of getting caught.

However, while AI-driven predictive policing appears to align with the rational-choice model, it also raises several concerns. One significant issue is that these systems rely on historical crime data, which often reflect **biases** in law enforcement practices. Communities that have been historically over-policed may appear as higher-risk areas in predictive models, even if crime rates in those areas are not necessarily higher. This reliance on biased data could

perpetuate the over-policing of marginalized communities, leading to racial profiling and further systemic discrimination. Thus, AI's application in predictive policing must be scrutinized for fairness to ensure that it does not reinforce the very biases that classical criminology seeks to eliminate through rational deterrence.

2. Positivist Criminology and AI

In contrast to classical criminology, **positivist criminology** emphasizes that criminal behaviour is influenced by factors beyond an individual's control, including biological, psychological, and social conditions. The positivist perspective, developed by theorists like **Cesare Lombroso** and **Enrico Ferri**, suggests that crime is determined by external forces, such as mental illness, poverty, or genetics, and not purely by rational choice. As such, positivism advocates for interventions that address the root causes of crime, such as rehabilitation, mental health care, and social support.

AI offers significant potential for criminology from a positivist perspective by providing tools to analyse large datasets and identify risk factors associated with criminal behaviour. Machine learning algorithms can identify patterns in social, psychological, and environmental factors that might contribute to criminal tendencies. For example, AI can process data on a person's socioeconomic background, family history, education, and psychological health to identify individuals at a higher risk of committing crimes. This predictive capability allows for early intervention strategies that target the underlying causes of criminal behaviour.

By analysing factors such as childhood trauma, mental illness, or substance abuse, AI could help direct resources to areas that focus on rehabilitation rather than punishment. Early interventions could take the form of social services, mental health support, or education programs designed to address the root causes of crime, in line with the positivist view that crime can be prevented by treating its underlying causes rather than merely punishing offenders.

However, a significant ethical concern arises from the potential misuse of AI systems. If the data fed into AI systems is not carefully managed and audited, it could reinforce biases based on race, socio-economic status, or gender. For example, a model might flag an individual as a higher risk for criminal behaviour based on their social or economic background, leading to pre-emptive interventions that are stigmatizing or overly punitive. Therefore, while AI can align with positivism's rehabilitative goals, careful attention must be paid to its implementation to ensure it does not perpetuate discrimination.

3. Social Structure Theories and AI

Social structure criminology, including theories like **Robert Merton's Strain Theory**, focuses on how societal inequalities and structural factors contribute to crime. Merton's Strain Theory, for example, argues that when individuals are unable to achieve societal goals (such as financial success) through legitimate means (like education or employment), they may resort to criminal activity. According to this perspective, crime is not just the result of individual decisions but is deeply embedded in the social and economic fabric of society.

AI, when used to analyse large-scale social data, can help identify and address these structural causes of crime. By examining factors such as unemployment rates, poverty levels, educational access, and social mobility, AI can highlight patterns that show how systemic inequalities contribute to crime. For example, predictive models could reveal how communities with high poverty rates are more likely to experience higher rates of theft or drug-related offenses. By identifying these links, policymakers and law enforcement agencies can design interventions that focus on reducing socio-economic disparities and providing opportunities for individuals in high-risk areas.

However, the use of AI in crime prediction through predictive policing raises concerns from a social structure perspective. While AI can certainly identify patterns of crime in economically disadvantaged areas, it often fails to address the root causes—namely, structural inequalities. Predictive models may target areas with higher crime rates, which often coincide with economically disadvantaged communities, without considering the deeper socio-economic factors driving the crime. Furthermore, reliance on these predictive models can lead to discriminatory practices that disproportionately target low-income and minority neighbourhoods, perpetuating a cycle of over-policing and social inequality.

Critics argue that AI-based predictive policing may divert attention from the broader structural reforms needed to address poverty, lack of education, and other systemic issues. Rather than focusing on crime prevention alone, a more comprehensive approach would include social policies aimed at reducing inequality and offering better opportunities to marginalized communities.

4. Critical Criminology and AI

Critical criminology is rooted in the belief that the criminal justice system often reflects and perpetuates power imbalances in society. This school of thought, influenced by thinkers like **Karl Marx** and **Michel Foucault**, emphasizes how laws and criminal justice practices disproportionately affect marginalized groups, especially racial minorities, the poor, and those

without political power. Critical criminologists argue that the system is designed to serve the interests of the powerful while criminalizing the poor and oppressed.

Critical criminologists are particularly concerned about the potential for AI tools to reinforce existing biases within the criminal justice system. Predictive policing, facial recognition, and other AI-driven technologies are often trained on historical crime data, which may reflect long-standing racial or socio-economic biases. If AI models are built on biased data, they can perpetuate and even amplify racial profiling, discrimination, and inequality.

For example, AI algorithms used in predictive policing may overemphasize the likelihood of crime in communities that have historically been over-policed, often communities of colour. This can lead to the criminalization of entire communities based on historical patterns rather than actual, current criminal activity. Additionally, AI-driven technologies like facial recognition have been shown to have higher error rates when identifying people of colour, which can lead to wrongful accusations and arrests.

Critical criminologists argue that AI in the criminal justice system must be carefully monitored and regulated to prevent it from becoming a tool for social control that disproportionately targets disadvantaged groups. They emphasize the importance of transparency in the design of AI algorithms and the need for community oversight to ensure that these tools do not further entrench societal inequalities.

Furthermore, critical criminology advocates for a more holistic approach to crime prevention, one that challenges the underlying power structures and addresses the root causes of social inequality. AI should be used not only as a tool for policing but also as a means to reform the systemic issues that contribute to crime, including discrimination, poverty, and lack of access to education and healthcare.

How AI is Helping the Criminal Justice System[7] in India

Artificial Intelligence (AI) is revolutionizing the criminal justice system in India by improving crime detection, investigation, and law enforcement efficiency. The integration of AI technologies in crime control, particularly in Maharashtra and Bengaluru, highlights the growing reliance on AI to support policing and forensic practices. Here's how AI is enhancing various facets of the criminal justice system in India:

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[7] Legal Service India, 2024. Artificial Intelligence in Criminal Justice System. *Legal Service India*. Available at: https://www.legalserviceindia.com/legal/article-13251-artificial-intelligence-in-criminal-justice-system.html#:~:text=In%20the%20courts%2C%20AI%20is,risk%20of%20recidivism%20for%20offenders [Accessed 27 December 2024].

1. AI in Crime Detection and Investigation

AI is playing a crucial role in the detection of criminals, aligning with the Classical Criminology principle that crime is best tackled through effective detection mechanisms. Maharashtra is set to establish the first AI-enabled Centre of Excellence for Crime Control. This will allow law enforcement agencies to conduct thorough investigations using AI-powered tools. The centre will focus on 360-degree investigations of cell phones, hard drives, and other electronic devices, enabling a more effective collection of digital evidence. This approach will help address the backlog of over 20,000 cases in Maharashtra awaiting data analysis, ensuring that evidence gathered through technological means is admissible in courts.

Moreover, AI can assist in analysing and identifying patterns in large volumes of data, helping to speed up investigations and uncover crucial evidence that might otherwise be missed. AI's ability to process vast amounts of data allows for better statistical modelling, which can be used in criminal investigations to identify suspects, trace their movements, and uncover hidden criminal networks. This also aids in the development of digital forensic repositories, enabling investigators to store and retrieve data more effectively, which is critical in today's age of rapid data expansion.

2. Predictive Policing and Crime Prevention

In cities like Bengaluru, AI is being leveraged for preventive policing. The local police use AI-driven software to integrate databases of known criminals, also known as "history sheeters," with real-time surveillance systems. When a known criminal exhibits suspicious behaviour at an unusual hour, facial recognition cameras send alerts to the command centre. This system helps authorities to respond quickly by dispatching patrolling officers to investigate potential criminal activity before it escalates.

Furthermore, AI tools like C4i in Bengaluru map various crime trends, such as geographical locations, timings, and the nature of incidents. The software identifies vulnerable areas and helps authorities allocate policing resources more efficiently, ensuring that high-risk areas receive more attention. This not only enhances public safety but also ensures that law enforcement is proactive rather than reactive.

AI-driven predictive policing also extends to crime prediction. By analysing patterns of criminal activity, AI algorithms can forecast the likelihood of specific crimes occurring in particular areas, as well as identify individuals who may be involved in criminal activities. This data-driven approach enables police to allocate resources based on risk assessments, reducing crime by targeting the highest-risk areas.

3. Enhancing Bail Decisions and Risk Assessment

AI's role is expanding into more sensitive areas of the justice system, such as bail decisions and risk assessments. Courts in India, like in many other parts of the world, are increasingly relying on AI algorithms to evaluate the risks associated with releasing a suspect on bail. By analysing an individual's criminal history, behaviour patterns, and demographic data, AI can help predict the likelihood of reoffending or the risk of flight, ensuring that judicial decisions are made based on objective data rather than subjective judgment.

AI is also helping in sentencing decisions by analysing past cases and predicting the appropriate sentence based on historical data. This application of AI aims to create a fairer and more consistent judicial system by eliminating human biases and inconsistencies in sentencing.

4. AI in Non-Violent Crime Detection

AI excels at identifying non-violent crimes such as fraud, money laundering, and counterfeit goods detection. Law enforcement agencies are increasingly collaborating with financial institutions to use AI to detect suspicious financial activities. By analysing patterns of transactions, AI can identify unusual behaviour that may suggest fraudulent activities, enabling quicker intervention.

AI can also identify counterfeit goods by analysing images or scanning barcodes, ensuring that fake products do not enter the market. This use of AI is particularly beneficial in industries where counterfeiting is rampant, such as in pharmaceuticals, electronics, and currency.

Forensic science also benefits from AI's ability to analyse digital evidence, particularly in fraud investigations. AI helps investigators uncover financial fraud by analysing large

datasets, identifying unusual patterns, and building statistical models to highlight suspicious activities.

5. AI in Correctional Systems and Recidivism Prediction

AI's integration with the neo-classical school of criminology has led to the development of recidivism prediction tools, which assess the likelihood that an individual will re-offend after release from prison. AI analyses factors such as the individual's criminal history, social environment, and psychological factors to provide judges with a clearer understanding of the risks associated with parole or early release.

These risk assessment algorithms are already being employed in some regions of India to make more informed decisions about parole and probation. By identifying offenders who are at a higher risk of reoffending, authorities can implement targeted rehabilitation programs or stricter supervision measures.

6. AI in Robot-Assisted Policing

Although more common in places like Dubai, AI-powered robots are being explored for use in Indian law enforcement. Robots can be deployed for routine surveillance, data collection, and even in more dangerous situations, such as bomb disposal. These robots can identify and neutralize threats without putting human officers at risk, improving public safety.

For example, robots equipped with facial recognition and explosive detection capabilities can be sent into high-risk areas, providing valuable data to headquarters while ensuring that officers remain safe. This kind of technology is especially useful in areas where traditional law enforcement is more difficult due to environmental hazards or a higher risk of violence.

7. Forensic Science and Statistical Evidence

AI's role in forensic science is crucial in supporting the criminal justice system by building statistical evidence that can reinforce or challenge arguments in court. AI's ability to process and analyse vast quantities of data allows forensic experts to construct graphical models that illustrate crime scenarios, providing clarity and visual representation of events for use in trials.

Moreover, AI helps in building repositories for digital evidence, ensuring that large amounts of forensic data, such as videos, images, and documents, can be safely stored, analysed, and

accessed by investigators. With the increasing volume of digital information, AI offers a solution to manage and retrieve crucial evidence from complex data sets.

AI is transforming the criminal justice system in India by enhancing crime detection, improving police efficiency, assisting in court decisions, and predicting future criminal activities. The integration of AI in law enforcement and forensic science not only strengthens the criminal justice system but also offers new opportunities for data-driven decision-making. From predictive policing in Bengaluru to AI-enabled crime investigation in Maharashtra, AI is playing a pivotal role in ensuring fairer, more effective policing and justice.

However, as AI continues to evolve, it will be essential to address the ethical implications, including concerns about privacy, data security, and bias, to ensure that its implementation remains just and equitable for all citizens.

Human Rights and Ethical Concerns in the Use of AI in Criminology[8]

The integration of Artificial Intelligence (AI) into criminology, particularly in law enforcement and criminal justice systems, promises a range of benefits—such as improved efficiency, predictive capabilities, and data-driven decision-making. However, these advancements come with significant ethical challenges and human rights concerns. The application of AI technologies in crime prevention, surveillance, and legal decision-making introduces complex questions about privacy, fairness, accountability, and the protection of individual rights. As AI systems become increasingly prevalent in criminal justice processes, it is essential to carefully consider their implications for human dignity, freedom, and equality.

1. Privacy Violations: Surveillance and Informed Consent

One of the most pressing human rights concerns related to AI in criminology is the invasion of privacy. AI-powered surveillance technologies, such as facial recognition, license plate readers, and predictive policing algorithms, enable authorities to monitor individuals in real-time without their knowledge or consent. These systems collect vast amounts of personal data, from physical features (such as facial images) to digital footprints (such as online activity or mobile phone data). While these technologies can help identify suspects and prevent crimes, they can also lead to mass surveillance, infringing on individuals' right to privacy.

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[8] Aloamaka, P. and Omozue, M., 2024. AI and Human Rights: Navigating Ethical and Legal Challenges in Developing Nations. *Khazanah Hukum*, 6(2), pp.189-201. Available at: SSRN: https://ssrn.com/abstract=4949414 or http://dx.doi.org/10.2139/ssrn.4949414 [Accessed 27 December 2024].

For instance, facial recognition technology used in public spaces can track people's movements without them being aware, creating a digital footprint that can be stored and analysed. In many cases, individuals may not even know their data is being captured, let alone have the opportunity to consent to its use. This lack of transparency creates a risk of unwarranted surveillance of innocent people, including marginalized or vulnerable communities. The use of AI tools without clear consent mechanisms undermines basic human rights, particularly in societies where individuals may already feel over-policed or targeted.

The right to privacy is enshrined in international human rights law, including Article 12 of the Universal Declaration of Human Rights and Article 17 of the International Covenant on Civil and Political Rights (ICCPR), which protect individuals from arbitrary interference with their privacy. The increasing use of AI surveillance technologies raises critical questions about how to balance crime prevention with the fundamental rights to privacy and freedom of movement.

2. Bias and Discrimination: Perpetuating Inequalities

AI systems are only as unbiased as the data they are trained on, and unfortunately, much of the data used in criminal justice applications is inherently biased. Predictive policing and risk assessment tools, for example, rely heavily on historical crime data, which often reflects systemic inequalities in policing practices. If AI systems are trained on biased data, they are likely to perpetuate and even amplify these biases, resulting in racial, socio-economic, and gender discrimination.

For example, in many countries, including India and the United States, marginalized communities—particularly racial and ethnic minorities—are disproportionately targeted by law enforcement. Predictive policing algorithms that rely on past arrest records or crime statistics may disproportionately target these communities, reinforcing a cycle of over-policing in areas that are already heavily surveilled. This can lead to a self-fulfilling prophecy where AI systems continuously reinforce the targeting of specific groups, leading to further discrimination and perpetuating inequalities in the criminal justice system.

Studies have shown that AI-driven tools used in sentencing or parole decisions may also reflect biased outcomes. Risk assessment algorithms used in courts to determine the likelihood of reoffending often take into account factors such as previous arrests, socioeconomic status, and neighbourhood—factors that are themselves influenced by historical inequalities in policing and the justice system. As a result, these systems may unfairly assess

individuals from disadvantaged backgrounds as being higher risk, leading to longer sentences or denial of bail based on biased predictions.

This racial and socio-economic discrimination violates the principle of equality and undermines the notion of justice, which should be based on fairness and impartiality. The United Nations' Universal Declaration of Human Rights (Article 7) guarantees equal protection under the law, and AI applications in the criminal justice system must be carefully monitored to avoid perpetuating harmful biases.

3. Transparency and Accountability: The "Black Box" Problem

Another significant ethical challenge in the use of AI in criminology is the lack of transparency in how AI systems make decisions. Many AI algorithms are built using complex, proprietary machine learning models that are often described as "black boxes." This means that while the AI may generate predictions or decisions, it is difficult to understand how or why the system arrived at those conclusions. In the criminal justice system, where decisions can have profound consequences—such as whether an individual is granted bail, sentenced to prison, or even convicted—transparency in decision-making is crucial.

For instance, if AI systems are used to determine a suspect's risk level or predict the likelihood of reoffending, the courts or law enforcement must have access to the reasoning behind these decisions to ensure fairness and accountability. Opaque decision-making can lead to situations where individuals are denied rights or subjected to unfair treatment without understanding the basis for those decisions. If a person is wrongfully convicted or denied parole due to a flawed algorithmic assessment, the inability to challenge or appeal these decisions raises serious concerns about accountability.

In response to these challenges, experts have called for the "explain-ability" of AI systems, ensuring that the algorithms are understandable to the public and to the justice system. AI models must be transparent in how they process data and generate decisions, especially when those decisions affect fundamental rights such as freedom and personal liberty. The criminal justice system relies on the principle of due process—the right to a fair and transparent legal procedure—and any AI tools used must adhere to these principles to avoid undermining trust in the system.

4. Autonomy and Human Oversight: The Role of Human Judgment

As AI systems become more integrated into criminal justice, there is a growing concern that the human element in decision-making could be eroded. AI may offer speed and efficiency,

but human judgment remains vital, particularly in areas that affect people's lives and freedoms. The use of AI to make decisions about sentencing, parole, or bail should not replace human discretion, as these decisions often require a nuanced understanding of individual circumstances, motives, and social context.

For example, while AI can assess the likelihood of recidivism based on historical data, it cannot account for a person's personal growth, rehabilitation, or remorse—factors that a human judge or parole officer may take into consideration. Over-reliance on AI in such areas may lead to overly mechanical decision-making that overlooks the human aspect of justice.

Human oversight is essential in ensuring that AI systems do not undermine autonomy or violate individual rights. AI should be viewed as a tool that assists, rather than replaces, human decision-makers. Courts, law enforcement, and other justice system stakeholders must maintain final authority in decisions that affect an individual's liberty, as AI cannot fully account for the complexities of human behaviour and legal context.

Moreover, the role of ethics committees and independent audits is crucial in monitoring the use of AI in the criminal justice system. These bodies can help ensure that AI systems are used responsibly and ethically, with proper safeguards in place to prevent abuses of power or wrongful decisions.

Balancing AI's Benefits and Human Rights

AI has the potential to transform the criminal justice system, improving efficiency, accuracy, and crime prevention. However, as its use grows, it is crucial to address the human rights and ethical concerns associated with these technologies. AI systems must be implemented with care, ensuring that they respect privacy, avoid bias, and maintain transparency and accountability.

By integrating human oversight into AI decision-making processes, it is possible to strike a balance between leveraging the benefits of AI and protecting individual rights. The criminal justice system must prioritize fairness, equality, and respect for human dignity, ensuring that AI serves the public good without compromising the rights of vulnerable or marginalized communities.

Conclusion

AI has the potential to transform criminology by making crime prediction, investigation, and case management more efficient. However, its application must be carefully balanced with ethical concerns, including privacy, bias, and fairness. Criminological theories provide valuable perspectives on how AI can be integrated responsibly into the criminal justice system.

It is crucial to develop AI technologies in a manner that respects human rights, ensures transparency, and promotes justice for all individuals, particularly marginalized groups. Through responsible and ethical implementation, AI can help create a fairer and more effective criminal justice system. AI may also violate human rights so to reduce its abuse we need to be proactive to maximize the benefit of the technology. In certain jurisdictions guidelines have been issued for development of ethical AI. The guidelines aim to promote a structure of trustworthy AI which has three components: (i) AI should be lawful (ii) AI should be ethical and (iii) AI should be robust. Although these guidelines are not legally binding, they are an important step forward. The following could be a few steps that can be taken to ensure that we safeguard human rights: A human rights impact assessment should be made before they are developed, aquired or deployed. Users should be made AI literate who are able to understand and interact with the system. Humans should oversee the deployment and working of the AI. Human intervention and monitoring should be carried out at every stage of AI system. This will ensure that the AI systems work in a regulated framework and respect human rights. Every person who has been impacted by any AI-related decision should have the recourse to challenge the same. This requires the nations to establish independent agencies that have the power to investigate and adjudicate such matters. There is a need to assess the impact and bring in policies to prevent the harm that this technology could unleash on the human rights regime. The technology can and will maximize the benefits only when efforts are made to minimize the damage that this intrusive technology could create.[9]

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[9] Dr. Kamal Kishore Singh, AI in Police Work,