

Artificial intelligence in crime counteraction: From legal regulation to implementation

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Abstract. The research relevance is determined by artificial intelligence (AI) as one of the ways to guarantee public safety and increase the effectiveness of law enforcement agencies. The study aims to investigate whether AI can be used in the legal system, with a particular focus on forensics and crime fighting. To achieve the research goal, the following methods were used: comparative legal, formal legal, historical legal, systemic and structural, and theoretical and prognostic. The article examines the use of AI in the legal sector from different perspectives and identifies “high-risk” AI systems. These systems should be used with caution and following specific criteria to ensure their safe and ethical use. In the context of criminal justice, it also examines how conventional digital technologies are connected to sophisticated AI capabilities, with a particular focus on the use of AI in the investigation of war crimes committed by Russia against Ukraine. While it is recognised that these materials must comply with applicable legal norms, AI is being used with great attention to collect and analyse data relevant to war crimes investigations. The results of the study show that although the use of AI in law enforcement operations can significantly increase the effectiveness of investigations, strict rules are still necessary to protect human rights and freedoms. It highlights how important AI is for war crimes investigations, especially considering Russian full-scale invasion of Ukraine. While it is recognised that these materials must comply with applicable legal norms, AI is being used with great attention to collect and analyse

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Keywords: information (digital) technologies; information and telecommunication system; war crimes investigation; forensic examination; forensic sciences

Introduction

The current state of crime fighting is associated with the need to use the latest forensic technology (optical imaging systems, 3D scanners, drones, quadcopters, multicopters), mobile DNA laboratories), artificial intelligence (AI) skills and digital technologies. The informatisation of society and the use of innovative technologies are increasingly exacerbating the problem of AI. The high rate of increase in the flow of information significantly affects people's daily lives, causing them to become disoriented and make suboptimal decisions due to lack of time.

L.I. Zhyvtsova (2023) argue that 90% of the world's data has been obtained in the last few years. Over the past three decades, the amount of data in the world has grown approximately tenfold every two years. Daily lives are heavily influenced by the rapid spread of information, which can lead to confusion and poor decision-making due to time constraints. In other words, it is useless to handle huge amounts of data while ignoring redundant information. As a result, information systems are needed that process data using advanced computer technology that can mimic human cognitive processes and be used to create and process various computer programs. AI technology will one day allow these intelligent robots to replace and organise human activities.

Zh. Udovenko and N. Rudenko (2023) investigated the advantages and disadvantages of introducing AI into the legal system of Ukraine and concluded that law enforcement agencies should use AI capabilities in their operations, as it is a legitimate necessity, especially when it comes to crime prevention. The detection, prevention and response capabilities of law enforcement software far exceed those of law enforcement officers. Law enforcement agencies across the country are now actively using AI technology in the following areas. The use of integrated AI systems in criminal investigations also helps to strengthen crime prevention strategies by facilitating more effective cooperation between law enforcement and other agencies. AI analytics tools can quickly respond to new criminal trends and modify your countermeasures to better suit the ever-changing criminal environment.

A study by O.I. Bugera (2021) shows that AI is increasingly being used by law enforcement organisations around the world to prevent crime in general. The inadequacy of the legal framework, incomplete regulatory mechanism, and lack of adequate scientific research all contribute to the effectiveness of this process. AI is a system of structured information technologies that handles complex tasks using a system of data processing algorithms and research methodologies that have been taken from other sources or created independently at work. AI can also be used to create and implement knowledge bases, decision-making models, data processing, and problem-solving algorithms. One of the most popular applications of AI for crime prevention is the installation of so-called intelligent security systems, which are equipped with various devices (sensors) for data collection, including high-definition video cameras.

AI components and technologies, as noted by K.O. Chevko (2023), are already used by active Ukrainian law enforcement agencies. This is the process of localising and eliminating cyber threats, cyber terrorism and cyber radicalisation. This involves timely detection and prevention of attacks on protected objects, as well as automatic detection of viruses and malware, which significantly reduces the likelihood of adverse consequences in each area. The future of cybersecurity automation looks very promising. It will provide future researchers with the ability to respond more quickly to new threats and work more agilely with larger data sets, enabling them to accurately and quickly classify criminal offences under the auspices of cybercrime. According to T.A. Shevchuk and Y.V. Svystun (2021), law enforcement agencies should use robotic intelligence capabilities in their work, as it is practical and necessary, in the fight against crime. Compared to humans, law enforcement software is much more adept at detecting, stopping and responding to crimes at early stages. Domestic law enforcement agencies are now actively using AI technologies in a variety of areas.

Given the above, the study aims to thoroughly investigate and analyse the potential of integrating AI into the legal system of Ukraine to increase the efficiency of law enforcement agencies, reduce crime and explore potential applications of AI in judicial proceedings.

Materials and methods

Sophisticated methods were used, combining general and special research methods. The dialectical method was used to identify the relationship between the development of AI technologies and their impact on law enforcement. The comparative legal approach made it possible to study and compare several legal frameworks related to the use and administration of AI. As a result, important patterns and difficulties related to the use of AI in several areas of international law enforcement were identified. The application of the formal legal method helped in a thorough study of existing legislation to identify legal restrictions on the use of AI. It is now possible to trace the evolution of legal principles of AI use and understand how historical background and events have shaped current legislation using legal-historical techniques. With the help of theoretical, prognostic and systemic research, the author clarifies the function and functions of AI in crime prevention, as well as the goals and directions of its use to improve the efficiency of law enforcement agencies and ensure the rights and freedoms of citizens. structural research approach. The study offers a complete picture of the prospects of using AI in the investigation of war crimes, as well as the opportunities and challenges associated with its implementation in law enforcement agencies. This was made possible by the broad methodological approach of the study.

The following international regulatory sources were highlighted in the study of this topic: European Parliament Resolution "On Artificial Intelligence: Issues of Interpretation

and Application of International Law Insofar as the EU is Affected in the Areas of Civil and Military Uses and of State Authority Outside the Scope of Criminal Justice” (2021), European Parliament Resolution “On Artificial Intelligence in Criminal Law and its Use by the Police and Judicial Authorities in Criminal Matters” (2021), European Parliament Resolution “On a Comprehensive European Industrial Policy on Artificial Intelligence and Robotics” (2019). The following documents were additionally analysed: On 21 April 2021, the European Parliament and the Council proposed a regulation that would amend several Union laws and create standardised AI rules, known as the “Proposal for a Regulation of the European Parliament and of the Council Laying down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Acts” (2021) and on 25 April 2018, the Commission sent a communication entitled Artificial intelligence for Europe (2018) to the European Parliament, the European Council, the European Economic and Social Committee and the Committee of the Regions. Ukrainian regulatory sources were given special attention, namely: the draft of the new Criminal Code of Ukraine (2023) was studied, the Instruction on the appointment and conduct of forensic examinations and expert studies, as well as scientific and methodological recommendations on the preparation and appointment of forensic examinations and expert studies, approved by Decree of the Ministry of Justice of Ukraine No. 53/5 “On the Approval of the Instruction on the Appointment and Conduct of Forensic Examinations and Expert Research and Scientific-Methodological Recommendations on the Preparation and Appointment of Forensic Examinations and Expert Research” (1998) and Order of the Cabinet of Ministers of Ukraine No. 1556-r “On the Approval of the Concept of the Development of Artificial Intelligence in Ukraine” (2021). These sources have become important sources of information for analysing and studying issues related to the use of artificial intelligence in the fight against crime, from legal regulation to its practical implementation.

Results and discussion

Legal requirements governing the use of AI and future opportunities for its use in crime combat. Among the areas of implementation of innovations by pre-trial investigation agencies are: 1) development and use of technical and scientific methods of search, collection and evaluation of evidence; 2) supply of advanced information technologies and their use by investigators and criminalists (detectives and investigators); 3) creation (development) and proposal of new methods, tactics and protocols for conducting searches and investigating general crimes.

The creation of electronic criminal cases (proceedings), remote (online) conduct of procedural actions, remote pre-trial investigation and court services are just some examples of how the latest information technologies are currently being used. An important result of the development of information technology in Ukraine is the creation of an information and communication network for pre-trial investigation. Part 1 of Article 106-1 of the Criminal Procedure Code of Ukraine (2012) provides that this network ensures the creation, collection, storage, search, processing and transmission of materials and information (data) in criminal proceedings.

Various unified registers can be used during the investigation (e.g., registration of expert and technical means,

register of individuals – public formations and entrepreneurs, register of court decisions, etc.) The web portal and mobile application “Diia” have gained recognition as a brand that shapes the perception of Ukraine as a digital state, or “state in a smartphone” (Zhyvtsova, 2023). AI must be used by law enforcement agencies to fight crime. The ability of a mechanical system to accept, process and apply the knowledge and abilities it has acquired is known as AI (Makhnenko, 2021). AI-based face, speech, text, and video recognition systems are already highly developed and widely used around the world (Radutniy, 2017).

Due to evolving economic and social dynamics, as well as current military and cyber threats, AI is beginning to play an increasingly important role in practice. For this reason, forensic and legal AI research is becoming increasingly important. As noted by G. Vermeulen *et al.* (2022), the use of such systems in law enforcement raises criminological, ethical, legal and technological issues, such as increased surveillance and control to prevent crime and the possibility of bias or influence in selection (including automated selection).

As for the use of AI systems and their components against Ukraine for military reasons and in cyberspace, this is one of the most pressing challenges in a country that was the subject of a significant military attack by Russia in 2022. The formation of criminal law policy in the field of AI was influenced by the reports of the Ukrainian National Group of the International Association of Penal Law (IAPL) (Shepitko *et al.*, 2022; Karchevskiy & Radutniy, 2023). This will be reflected in the resolution of the IAPL Congress in Paris in 2024.

Changes in the definition of AI, expanding the boundaries of its real-world application, challenge the legal system to regulate these relations, addressing the issues of punishment of operators of AI-based systems, factories and suppliers that produce them, as well as states that direct them for military, criminal or manipulative purposes. The issue of whether AI can be a tool to assist criminal justice organisations should also be considered (Kaplina *et al.*, 2023).

Order of the Cabinet of Ministers of Ukraine No. 1556-r “On the Approval of the Concept of the Development of Artificial Intelligence in Ukraine” (2020) defines the idea of developing artificial intelligence in the country, which also refers to the possibility of performing complex tasks using a system of information processing algorithms and scientific research methods. It also mentions that AI can independently create knowledge bases, information, decision-making models, etc. The European Commission has defined AI in the following way, taking into account the expanding use of the technology in the EU: “human-made systems that... operate in the digital or physical world by absorbing information from the environment, analysing the collected structured or unstructured data, drawing conclusions based on the information obtained from this data, and choosing the most appropriate course of action (according to predefined guidelines) to achieve a specific goal” (Artificial intelligence for Europe, 2018).

The European Parliament adopted the European Parliament Resolution “On a Comprehensive European industrial Policy on Artificial Intelligence and Robotics” (2019). This resolution states that companies using and developing AI should consider the possible social, environmental and health effects that AI algorithms and robots may have on current and future generations. The European Parliament’s plan clearly states that rules on AI should be implemented

shortly, and that Europe is urged to use it responsibly. It is worth noting that, given the European growth path, European authorities are putting a lot of effort into regulating AI. This law will soon be in force in Ukraine as well.

For example, the European Commission's work on AI is embodied in Artificial Intelligence for Europe (2018). S. Voronova (2021) highlights the specific legislative procedures of the EU in the field of AI regulation: "...the Council has set the goal that "subject to clear safeguards" law enforcement agencies should be able to integrate AI technologies into their daily activities by 2025. Concerning AI in the justice system, the Council affirms that human decision-making is essential and stresses the need for robust legal safeguards to protect the rights to counsel, presumption of innocence and fair trial".

The Automated Intelligence Act, a new law adopted by the European Parliament and Council that harmonises AI rules and changes certain connectivity rules, has amended the laws governing this area. Thus, Title II of the AI Law (Art. 5) prohibits the following: using AI to significantly alter human behaviour (physical or psychological harm) employing methods that are subconscious and outside of human consciousness; using AI to alter behaviour (physical or psychological harm) by exploiting the age or physical or mental disability of vulnerable groups of people; using AI to help authorities assess or classify people based on their known or social behaviour; and using AI-based remote biometric identification systems.

Further, Art. 6 of the mentioned AI Act references "high-risk" AI systems that have a negative impact on human security or fundamental rights. The AI systems mentioned in Annex III will also be considered high-risk in the following areas: biometric classification and identification; migration management, protection against persecution and border control; control and operation of vital facilities; vocational and higher education; employment opportunities, employee management and freelance work; availability and use of public and private benefits and services; security forces; administration of justice and democratic systems.

AI applications and use are becoming more and more controlled in the European Union, to the point where they are either completely banned or subject to severe restrictions, especially in the criminal justice system. The process of drafting the legislation itself and the subsequent actions taken to enforce it is clear. Note that the European position primarily concerns the personal responsibility of AI developers and their employers. For this reason, the interesting views of some scholars on the potential of defining AI as a crime have not yet been confirmed by the trends in regulating AI and determining liability for its use in certain sectors (Radutnyi, 2017).

Concerning the use of AI in wartime, the European Parliament has stressed that "the last word in decision-making should always be with the human being" and "Individuals, disputants and Member States should be held accountable for actions resulting from the use of these systems". AI in the justice system and its unlawful use by law enforcement and judicial authorities is addressed in a 2020 European Parliament resolution, which points to serious concerns about the very possibility of using or misusing AI systems due to fears of automated discrimination on various grounds and bias; the need to ensure that decisions in law enforcement and judicial authorities are made only by a person capable of taking responsibility; a call for a ban on permanent analysis

and recognition in public places based on certain features; a proposal to ban private facial recognition databases (emulating Clearview AI); and a freeze on law enforcement agencies using facial recognition technology, except for victims.

Reviewing the legal frameworks and perspectives on the introduction, use and accountability of AI, the following trends can be seen: 1) Criminal justice organisations are completely prohibited from deploying AI; 2) Individuals, groups and states whose interests are served by the use of AI are held accountable for the use of AI and any potentially harmful consequences, including criminal liability. 3) The rights, duties and responsibilities of participants in the use of AI within the European Union are established.

The implementation of AI regulations in Ukraine is still at an early stage. The concept of AI development in Ukraine was approved by the Cabinet of Ministers of Ukraine (Order of the Cabinet of Ministers of Ukraine No. 1556-r, 2021). The meaning of AI differs from the definition of the term in the EU. The concept of AI is that it is a set of organised information technologies that allow the use of an algorithmic system and scientific research methods to process data that is either independently generated during the execution of tasks or obtained from external sources. Systems that exhibit intelligent behaviour, such as AI systems, analyse their environment and occasionally act independently to achieve pre-defined goals. In addition, AI can be used to develop and use its knowledge bases, data processing algorithms and decision-making models to solve problems. The European Union describes AI as a broad class of software systems that can operate in cyberspace, such as voice assistants, search engines, image analysis software, smart automation, unmanned aerial vehicles, drones, and applications. The concept lists issues in the areas of research, education and training, public administration, defence, cybersecurity, information security and justice that AI can help address. However, it does not provide any recommendations for oversight of the areas in which AI can be applied. However, the concept does not address the difficulties associated with restrictions and outright bans on the use of AI in Ukraine, as well as concerns about liability and potential harm that AI systems can cause.

According to the Concept for the Development of AI in Ukraine, the justice sector should fulfil such tasks as building information systems and registers, implementing AI-based legal advice, preventing socially dangerous phenomena, developing a plan for the re-socialisation of prisoners, and making court decisions in cases of low complexity (Order of the Cabinet of Ministers of Ukraine No. 1556-r, 2021). An analysis of the responsibilities established in one area of justice shows that there is no consensus between the EU and Ukraine on AI regulation. While the EU emphasises individual decision-making rather than the area of justice, it is argued that court decisions are made in cases of "minor complexity" in Ukraine. In comparison, while the development of modern technology in the Ukrainian judicial system may contain certain elements of AI, it is not AI. However, law enforcement agencies, criminal justice systems and forensic companies often underestimate the difficulties of using AI to collect and evaluate data on human traits. Therefore, the integration of EU and Ukrainian legislation is vital and promising to protect human rights, end discrimination on any grounds, and bring Ukraine closer to European standards.

Criminal liability for the use of AI (provided that its use is prohibited) and potentially harmful consequences also

seem promising. The General and Special Parts of the current or amended Criminal Code of Ukraine should address this issue by providing for criminal liability of those who developed the AI system, whether individuals or legal entities. It makes sense to introduce criminal liability for violating the ban on the use of AI in certain areas, which has dire consequences.

Use of digital technologies and AI in criminal cases.

AI, along with other digital technologies, is becoming increasingly important for the pre-trial investigation process. However, due to the lack of appropriate legal control over the possibilities of applying and further processing the results of using AI in criminal proceedings, the current criminal procedure legislation was not ready for such a digital revolution in criminal proceedings. Such a situation is critical, especially in martial law, when access to the scene of an incident is limited/absent due to active hostilities and/or occupation. Moreover, failure to comply with the criminal procedure form may result in the inadmissibility of such evidence in court, which is particularly dangerous if such digital evidence is submitted to international institutions (e.g., the International Criminal Court, where the standard of proof is “beyond reasonable doubt”). This does not diminish the role of the developed strategic documents on AI in Ukraine/abroad, but the practice of investigating war crimes in Ukraine exposes these issues. For example, Order of the Cabinet of Ministers of Ukraine No. 1556 “On the Approval of the Concept of the Development of Artificial Intelligence in Ukraine” (2021) emphasises the need for further development of the technologies currently available in the field of justice. There are good reasons to conclude that there is an insufficient basis for the development and proper functioning of digital technologies in the justice sector in Ukraine, given that the focus is primarily on improving current technologies rather than introducing new ones, especially during the investigation process, and the existence of a general reference to the common principles and rules for their use developed and in force in the European Union (Regulation of the European Parliament..., 2021).

AI is used to analyse and consolidate a large amount of digital data, extract text from video and audio content, search by keywords, etc. For instance, when there are many interviews and/or interrogations, and it is not physically possible to listen to each of them, AI can be used for such purposes (Basysta *et al.*, 2024). It runs so fast that it can replace an entire human staff, while being efficient, analysing large amounts of information and categorising it according to a set filter (in the case of interviews with prisoners, it is possible to compile a conditional map or matrix of the location or concentration of prisoners on a certain date, track their movement and conditions of detention).

Moreover, AI can detect difficult aspects of objects that are relatively new to Ukrainian realities. This applies to the study of satellite images, the search for “conditional” places where the “human eye” is not always able to distinguish between different components and establish the necessary connections to find the necessary elements. AI, on the other hand, has advanced tools that allow it to quickly analyse satellite imagery, create a damage map and plot a course of fire. But it’s also important to keep in mind that working with AI poses some significant obstacles.

Ensuring the privacy and security of the data processed and stored by AI algorithms is a serious challenge. This

involves answering, among other things, the following questions: which servers store the data that the AI receives for analysis, categorisation, grouping and processing; who has access to this data and who is the legal owner of all stored data; whether the AI user is entitled to transfer this data to third parties and, if so, under what circumstances; how long this data may be stored on the relevant servers; and for what purpose.

There is also the issue of the ability and legitimacy of using AI to search for information in closed profiles and other sources that are not open, or when data collected by a particular company has been sold/stolen and unauthorisedly “leaked” to the network. The data in the public domain were voluntarily placed by their owners, who by their conclusive actions gave their consent to such placement and further review by an unlimited number of persons. As a rule, in such situations, a person understands that personal data becomes public and can be copied or otherwise used by third parties, even if the profile is restricted to a certain group of users.

When personal information, for example, has been collected from a certain audience and then “leaked” to the network without the consent of the data rights holders, it is a different issue altogether, and AI has discovered this information. The legality of using such data in criminal proceedings and whether the “fruit of the poisonous tree” theory will be applied in court then naturally becomes a matter of debate. In extraordinary circumstances, investigators may use such materials only as a guide when creating investigative versions and choosing a strategy for conducting certain investigative (search) actions; however, it should never serve as a basis for prosecution. It is necessary to “avoid treating open-source information as a panacea” or “as a substitute” for traditional evidence (Murray *et al.*, 2022).

This aspect of AI is particularly important, also given that Europol has created a new task force to facilitate ongoing investigations of major international crimes committed in Ukraine since February 2022, using open-source intelligence (OSINT) analysis. Fourteen countries have joined the group – Belgium, France, Germany, Ireland, Italy, Lithuania, the Netherlands, Norway, Portugal, Spain, the Slovak Republic, Slovenia, the United Kingdom, the United States of America and the United States of America. The above-mentioned Task Force is led by the German Federal Criminal Police Office (Bundeskriminalamt) and the International Crime Unit of the Dutch National Policy Office, with the support of Europol and its analysis initiative “Major International Crime” (Europol sets up OSINT taskforce..., 2023). The results of such studies can also be used in the future to create “detailed digital platforms” that help prosecutors, defence, judges, victims and the public better understand how each piece of visual evidence fits into, for example, a geographical space (Koenig *et al.*, 2021). This is particularly important because, according to B. Holovkin *et al.* (2023), cybercrime has become a powerful tool of geopolitical warfare, a weapon of cyber aggression, and a serious threat to both regional and global security. It is only natural that, as a result, most of the evidence will be digital.

It is also necessary to consider the “downside” of using AI to create false content or develop scripts for “hacking” or other unauthorised access to personal data. This refers to situations where additional elements created and added by AI are added to the original content or vice versa. In other words, AI can be successfully used to create high-quality fakes and deepfakes that will be difficult to detect, and if the

relevant forensic examinations are carried out, the goal for which they were developed will be achieved, as such digital products are instantly imprinted in human memory and can have a significant impact on the population. Quite often, this AI technology is used to propagate a desired narrative to the masses. An example of this is when the artificially created, deep fake-generated mayor of Kyiv spoke with the leaders of five European capitals and the only doubts these leaders had been about the questions he asked and the use of Russian, but not about his appearance, facial expressions, gestures, etc. Thus, there is a high risk of widespread dissemination of blatantly false information, the consequences of which will be very difficult to overcome and correct. Such cases discredit AI and other digital technologies. An important issue and challenge are the procedural processing of data obtained with the help of AI, as such materials may be subject to review in courts in the future. At present, the viewpoint that preference is given to the recording of actions using AI technologies is mostly supported. However, the issue of using these technologies as a tool and further such recording remains open.

Thus, the pre-trial investigation process is increasingly dependent on AI and other digital technologies. Unfortunately, the options for using AI in criminal proceedings and further processing the results are not regulated by the current criminal procedure rules. AI is used for keyword searches, text extraction from video and audio content, satellite photo evaluation, and analysis of a wide range of digital data. However, the possibility and legality of using AI for information retrieval is a matter of debate.

AI employment in prosecuting war criminals. Technologies used in the investigation of war crimes should be given special attention when investigating the possible use of such systems in criminal investigations (Dakalbab *et al.*, 2022). One such system is the AI face recognition system created by the American startup Clearview AI. The advantages of this technology are:

1) provide extremely accurate facial recognition for all populations. Indeed, Clearview AI's face recognition algorithm is designed to take into account various visual conditions, changes in facial hair, age-related development, and changes in posture and pose;

2) with more than 40 billion face photos from publicly available online sources such as social networks, photo sites, media, and more, Clearview AI's face recognition system functions as a search engine

3) use of industry-standard testing conducted by impartial third parties for routine verification and testing of the system. Clearview AI used a mechanism established by a separate US academic institution to verify and validate its system to ensure that it met the stated 99% accuracy threshold;

4) implementing security measures to reduce the likelihood of unwanted access or use through a secure cloud platform containing more than 40 billion facial photos. All data is stored in real-time on servers in a secure data centre with strict internal access controls;

5) reducing false positives, as Clearview's AI system is hard-coded, it does not purposefully track matches or compare percentages with results. If the search accuracy is less than 99%, the Clearview AI system does not offer results, reducing the likelihood that a client will use the technology to identify the wrong person;

6) ensuring that people are held accountable. With each use of Clearview AI, a separate report can be generated that

can be used, which contains all the data a consumer needs to identify themselves. Search history, search reason, and user identification are stored in the report (Shukla *et al.*, 2020; Wang *et al.*, 2020).

AI-based face recognition technology developed by the US company Clearview AI has been used in Ukraine since March 2022 (Zachek *et al.*, 2023). The full-scale Russian invasion of Ukraine was the main factor that affected the country's ability to use this technology. The Ministry of Defence of Ukraine was the first organisation to use the technology, but it was later joined by several other organisations, including the National Police of Ukraine. Today, 18 government ministries and institutions in Ukraine use facial recognition technology.

The following results were made possible by verifying and studying the application of a specific AI-based facial recognition technology during the full-scale Russian invasion of Ukraine. Between March 2022 and November 2023, nearly 230,000 Russian military and officials involved in the full-scale invasion were identified using facial recognition technology created by the American corporation Clearview AI (Bergengruen, 2023). Around 100 users of the State Border Guard Service used this face recognition technology between March 2022 and April 2023, which allowed them to identify more than 10,000 people. Among them are 50 people involved in the forced removal of children from the temporarily occupied territories of Ukraine and their transfer to Russia, Russian military personnel and members of illegal armed groups, and Russian propagandists who provide material support to the occupation forces and participate in information activities. war against Ukraine, collaborators and traitors to Ukraine, people involved in criminal and administrative offences, as well as Ukrainian citizens detained during this period. Using this methodology, the Prosecutor General's Office was able to locate 198 missing Ukrainian children, many of whom had been adopted by Russian families or transported to "re-education" camps after being forcibly removed from orphanages and temporary shelters. Furthermore, it could be verified that each of them is on Russian territory or in areas that Russia has seized. The Prosecutor's Office of the Autonomous Republic of Crimea has identified 70 members of the illegal military formation "Self-Defence of Crimea". In addition to their involvement in several crimes during the month of using the system, they helped the Russian armed forces occupy Crimea. The facial recognition system capabilities helped locate 150 teenagers and orphans who were on the peninsula in 2014 and were to be deported to Russia (Clearview AI CEO..., 2023). As of November 2023, facial recognition technology has identified the faces of 71,000 dead Russian soldiers. The Ministry of Internal Affairs of Ukraine announced on Poter.net in response to Russian propaganda that its forces are not losing ground. In addition, it has been demonstrated that the Clearview AI facial recognition system can accurately identify the deceased even in situations where the subject's face is deformed (Harwell, 2022). Resolving cases in situations where people are unable to provide information about themselves for objective or subjective reasons. For example, a face recognition system was used to identify a person who was in a Ukrainian hospital and claimed to be a Ukrainian soldier who had suffered shell shock and could not remember anything except that he was Ukrainian. However, using an AI-based facial recognition system, it was determined in a matter of minutes that the person was a Russian soldier.

For example, the American development Clearview AI helped in the process of AI-based face recognition, which allows identifying: the deceased; persons who, for objective or subjective reasons, cannot provide information about themselves; Russian military personnel, representatives and members of illegal armed groups; people involved in joint activities; captured Ukrainian citizens; children from Ukraine who were deported to Russia and the temporarily occupied territories; individuals involved in the removal of children from the territory of Ukraine; and Ukrainian investors who continued to do business with Russian companies after the full-scale invasion of Ukraine.

Using AI in forensic sciences. The use of digital data, including images, video and audio recordings, in court cases is expected to increase significantly by 2024. This data is captured by CCTV cameras, smartphone and tablet cameras, and a significant amount of such information is available on the Internet, social media, cloud storage, etc. Such data becomes an integral part of the evidence base, providing the possibility of establishing important information (AL-Marghilani, 2022). These materials can be the subject of forensic portrait research, linguistic analysis of speech, photographic examination, video and audio recordings, etc. depending on the problems to be solved. Modern scientific and technological advances have also improved the technique and methodology of data investigation, giving forensic scientists access to perspectives that were previously considered available only in science fiction (Ushenko *et al.*, 2023).

For example, if it is necessary to identify a person by their appearance from images captured on various media (digital images, video, various reproductions, photographs), a portrait forensic examination is ordered. This is important for establishing the identity of an unknown offender, suspect or victim, the facts of documents belonging to a certain person, etc. The laws of human physiological structure, changes in these signals during life and after death, and the use of these indicators in the investigation of criminal offences are the topics of portrait forensic examination. During the forensic portrait assessment, the following questions will be considered: whether the image shows the subject of the photographs sent as an example; whether the image shows one person or several (video); if the photograph of the deceased matches the persons whose photographs were provided as an example (Decree of the Ministry of Justice of Ukraine No. 53/5, 1998). During the portrait forensic examination, the forensic expert analyses the characteristic features of the face in the images: the shape of the head, eyes, nose, mouth, the distance between the corresponding elements, as well as other individual features of the appearance (moles, scars, etc.). The comparison is made by further comparing, superimposing and linearly combining the relevant features using computer software. However, portrait examinations often involve the use of a face captured by a CCTV camera, for example, during the commission of various crimes, or materials from social media. In these cases, the forensic expert has to deal with grainy, low-quality photos (videos) or images taken from different angles. AI capabilities have recently been presented to optimise the relevant research (Capuano *et al.*, 2022).

In the case of the shooting of a Ukrainian serviceman by the Russian military, a portrait examination conducted by the Kyiv Scientific Research Institute of Forensic Expertise (KSRIFE) identified the deceased Hero of Ukraine Oleksandr

Matsievskiy. This was the first time AI was used in such research in Ukraine. The forensic experts were asked to make a verdict on the identification of the fallen Ukrainian soldier on the video. KSRIFE specialists were sent a video of the incident; it was posted online on 6 March 2023. In addition, comparative samples were sent, which are images of people who, in the opinion of law enforcement agencies, could be in the video. The problem was the low quality of the video material under investigation and the foggy photographs that the forensic experts pointed out. KSRIFE experts have verified that the Ukrainian soldier in the video is a sniper from the 163rd Bat. 119th Brigade. TRO of Chernihiv region, O. Matsievskiy (In identifying the body of the deceased Matsiyevsky..., 2023). As a result, the use of AI has shown how to progressively use modern technologies to realise personal identity.

Experience of the National Scientific Centre “Non. Prof. M.S. Bokarius Forensic Science Institute” with Skeleton ID software (craniofacial overlay, face comparison, biological profiling and comparative radiography) is another illustration of the use of modern technologies for personal identification. A person can now be identified in seconds (previously it took hours or even days) thanks to Skeleton ID, a patented technique that scans multiple skulls, bones and faces simultaneously. The software can be used to compare unidentified remains in mass graves or to search for missing persons in databases. The tandem 3D scanner of the National Scientific Centre “Non. Prof. M. S. Bokarius Forensic Science Institute” Artec Leo 3D scanner and Skeleton ID software will be used in the future to solve highly complex expert research projects (Kliuiev, 2023). In addition, Skeleton ID forensic identification software is actively used by authorities around the world when it is not possible to identify a person by DNA or fingerprints. The use of Skeleton ID software demonstrates the successful application of modern technologies in the field of forensic examination and law enforcement, demonstrating the speed, efficiency and increased opportunities for personal identification.

AI is also actively used in other types of forensic investigations. Unlike portrait and forensic examinations, photographic examination, for example, considers both photo and video materials. It is recommended in cases where it is necessary to store information about an image in an incomprehensible format, for example, when it is necessary to find out how large the objects in the image are, where the cars are located concerning the edges of the road where the image was taken, or how to recreate the material circumstances of the scene from drawings. Often, a photographic technical examination is ordered to detect signs of editing in the images, identify objects in the images, establish the actual size of the objects depicted in the image, as well as information signs (e.g., vehicle licence plate) contained in the image (Chorny *et al.*, 2022). Such comparative studies are carried out using image quality assessment methods (local focus quality methods, noise characterisation methods, Discrete Cosine Transform (DCT) analysis methods, and image entropy analysis methods). In addition, AI technologies are also being introduced in photographic examinations. In addition to the image enhancement technologies already mentioned, for example, the Unet artificial neural network model (with the EfficientNetB4 feature classifier) is used, which has proven to be effective in detecting signs of photo image editing. As a result, AI can identify specific changes made to an image during editing, as well as improve image

quality and clarity. AI is not a universal tool for identifying every change that can occur in images or films (Rawat *et al.*, 2023). The algorithms used to detect these deviations and the calibre of fake content determine how effective it is.

Thus, AI in the judiciary is a relevant topic that has both advantages and disadvantages. AI tools can significantly speed up the judicial process by analysing court decisions and facilitating quick access to information. But using AI means paying attention to moral issues and ensuring that accountability, transparency and citizens' rights are protected. In addition to conducting expert assessments and training for judges, creating legal regulations that set standards for the use of AI in the judiciary, as well as researching and improving AI-related methods and technologies, are also important. In addition, it is crucial to proactively prevent and manage the risks associated with the use of AI, such as the protection of cybersecurity, privacy and personal data.

Conclusions

The issue of adding AI components to the fight against crime and its tools in criminal proceedings is becoming increasingly problematic in the current environment due to the use of information (digital) technologies. The study of laws regulating the use of AI demonstrates the significant impact of technology on a range of human efforts and the need for proper control, including the establishment of prohibited behaviour.

At the moment, the views on the potential use and regulation of AI in the EU and Ukraine differ. The definition of AI in the concept differs from the definition of the same term in the EU. The European Union is moving towards regulating the use of AI and defining the rights, duties, and responsibilities of participants in this space. It is worth noting that in light of the European growth direction, the European authorities are putting a lot of effort into regulating AI. This law will soon be implemented in Ukraine. The very prospect of using or abusing AI systems, as well as the detrimental impact on human security or fundamental rights, are major

concerns in Europe. The process of bringing Ukrainian and EU legislation in line with European norms, ensuring human rights, and prohibiting discrimination on any grounds is ongoing. It also holds promise for regulating criminal liability for the use of AI (provided that its use is prohibited) and the potentially dangerous consequences it may cause. These issues should be addressed in the current or updated Criminal Code of Ukraine by establishing criminal liability for individuals and legal entities that develop AI systems.

The pre-trial investigation process is increasingly relying on AI and other digital technologies. It describes the use of AI in open-source intelligence (OSINT) analysis and open-source information retrieval. Unfortunately, the regulation of the use of AI in criminal proceedings and the subsequent processing of findings is not covered by the current instructions on criminal procedure. When studying the potential use of AI in criminal proceedings, special attention should be paid to technologies used in the investigation of war crimes. The use of AI-based facial recognition technology, created by the US business Clearview AI, allows for the necessary processes. AI is a topic of great interest in the court, and it has both advantages and disadvantages. AI techniques that analyse court decisions and accelerate access to information can significantly speed up the judicial process. The Skeleton ID programme works well in forensic identification investigations. However, the use of AI requires consideration of ethical issues and ensuring transparency, accountability, and respect for the rights of citizens.

Future research should address current forensic knowledge, as well as international experience and practice, and focus on the development and use of AI as a component of information technology in law enforcement and justice.

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Conflict of interest

None.

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Штучний інтелект в протидії злочинності: від правового регулювання до реалій застосування

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Анотація. Вивчення теми має важливе значення, позаяк штучний інтелект (ШІ) є одним із способів гарантувати громадську безпеку та підвищити ефективність правоохоронних органів. Кінцева мета дослідницької діяльності полягає в тому, щоб дослідити, чи можна використовувати ШІ у правовій системі, з особливим акцентом на криміналістиці та боротьбі зі злочинністю. Для досягнення мети дослідження було використано наступні методи: порівняльно-правовий, формально-юридичний, історико-правовий, системно-структурний та теоретико-прогностичний. У статті розглядається використання ШІ в юридичному секторі з різних точок зору та визначаються системи ШІ «високого ризику». Ці системи необхідно використовувати надзвичайно обережно та відповідно до конкретних критеріїв, щоб забезпечити їх безпечне та етичне використання. У контексті кримінального правосуддя також розглядається, як звичайні цифрові технології підключаються до складних можливостей ШІ. Особливу увагу приділено застосуванню ШІ в розслідуванні військових злочинів, скоєних Росією проти України. Хоча визнається, що ці матеріали мають відповідати чинним правовим нормам, ШІ використовується з великою увагою для збору та аналізу даних, важливих для розслідування військових злочинів. Результати дослідження свідчать про те, що, хоча застосування ШІ в правоохоронних операціях може значно підвищити ефективність розслідувань, суворі правила все ще необхідні для захисту прав і свобод людей. Підкреслюється, наскільки важливий ШІ для розслідування військових злочинів, особливо в світлі повномасштабного вторгнення Росії в Україну. Хоча визнається, що ці матеріали мають відповідати чинним правовим нормам, ШІ використовується з великою увагою для збору та аналізу даних, важливих для розслідування військових злочинів. Результати дослідження свідчать про те, що, хоча застосування ШІ в правоохоронних операціях може значно підвищити ефективність розслідувань, суворі правила все ще необхідні для захисту прав і свобод людей. Підкреслюється, наскільки важливий ШІ для розслідування військових злочинів, особливо в світлі повномасштабного вторгнення Росії в Україну

Ключові слова: інформаційні (цифрові) технології; інформаційно-телекомунікаційна система; розслідування воєнних злочинів; судова експертиза; судові науки