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Artificial Intelligence Technologies in Criminal Procedural Proving

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Artificial intelligence,
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digital technologies
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neural network,
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Abstract

Objective: to summarize and analyze the approaches, established in criminal procedural science, regarding the use of artificial intelligence technologies, to elaborate an author's approach to the prospects of transformation of criminal procedural proving under the influence of artificial intelligence technologies.

Methods: the methodological basis of the research is integrity of general, general scientific and specific legal methods of legal science, including abstract-logical, comparative-legal and prognostic methods.

Results: the main areas of using artificial intelligence technologies in the criminal procedure are defined, such as prophylaxis and detection of crimes, organization of preliminary investigation, criminological support of crime investigation, and assessing evidences at pre-trial and trial stages. The author comes to a conclusion that the rather optimistic approach to this issue, established in the science of criminal procedure, significantly outstrips the actually existing artificial intelligence technologies. The main requirements are identified, which the activity of using artificial intelligence in collecting evidences in a criminal case should satisfy. The author pays attention to the problems of using artificial intelligence technologies in conducting expert assessments, requiring an improved methodology of forensic work. The issue is considered of the prospects of transforming the criminal-procedural proving process under introduction of artificial intelligence technologies. A conclusion is substantiated that the assessment

of evidences with mathematical algorithms, in which preset values of each evidence quality are used, contradict to the principle of free assessment of evidences in the criminal procedure. The author comes to a conclusion that today there are no sufficient grounds for endowing artificial intelligence with legal personality during proving.

Scientific novelty: the work presents an attempt to consider the role of artificial intelligence in the criminal-procedural proving; it specifies the requirements to be met by this technology during evidences collection and analyzes the prospects of transforming the proving process under the introduction of artificial intelligence technologies.

Practical significance: the main provisions and conclusions of the research can be used to improve a mechanism of legal regulation of artificial intelligence technologies in the criminal procedure.

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Contents

Introduction

The theme of artificial intelligence in a criminal procedure seems rather futuristic, as the phenomenon per se can be called purely technical; essentially, it is no more than a mathematical algorithm intended for, to keep it simple, processing the incoming information and forming new information on its basis. However, digital technologies so rapidly enter not only everyday life but also such special spheres as criminal procedure, that science cannot stay aloof and ignore the issues which at first glance seem to have no real practical application.

Researchers justly note that we will not be prepared for new challenges emerging in connection with modern technologies, if we do not discuss them right now (Vesnic-Alujevic et al., 2020; Feijóo & Kwon, 2020; Robles Carrillo, 2020). Hence, it is especially important to study the prospects of artificial intelligence technologies in the criminal procedure, to analyze the problems emerging thereof and search for possible optimal variants of solving them, and to predict the ways of criminal procedure development.

Criminal procedure, like any other branch of legal science, requires an objective and unbiased assessment of how the use of artificial intelligence corresponds to the goals and tasks set before it, what influence the use of these technologies has and will have in the future on the protection of personality against unsubstantiated criminal prosecution. Such assessment should not be excessively and groundlessly optimistic, as in the absence of strong artificial intelligence any statements about robots substituting judges tomorrow cannot be perceived seriously. However, one should not slide to the opposite – to blind negation of the prospects of using new technologies, including in such a complex abstract sphere as the proving process.

One should agree with the researchers who believe that there is a need to analyze the approaches, established in the science of criminal procedure, to assessing the prospects of using artificial intelligence technologies and, based on such analysis, to consider the issue of the role of these digital technologies in the criminal-procedural proving (Silva et al., 2020; Kaur et al., 2023; Wang & Ma, 2022; Kalai et al., 2022; Cascavilla et al., 2021).

1. Mathematical algorithms in the service of criminal procedure

As early as in 1990, Professor Rissland noted that there is a fruitful synergy between law and artificial intelligence; law opens broad opportunities for developing analytical and computational models of artificial intelligence; at the same time, certain characteristics of law make it an especially complicated sphere for artificial intelligence (Rissland, 1990).

Thirty years after these statements we can distinguish several areas in which artificial intelligence technologies are used or are planned to be used in criminal procedure (in a broad sense).

1.1. Prophylaxis and detection of crimes

Scholars mark the potential of the artificial intelligence technologies in the sphere of prophylaxis and detection of crimes. For example, foreign researchers write about the possibility of using artificial intelligence to detect some cybercrimes (Kaur et al., 2023; Kalai et al., 2022; Cascavilla et al., 2021). A work by A. M. Tsirin and E. A. Artemenko describes software based on artificial intelligence technologies, which is intended to analyze the performed monitoring or oversight activities and reveal the true reasons

for damage incurred and the indicators of risk of the potentially dangerous observees (Tsirin & Artemenko, 2023). To struggle against corruption, N. A. Kuzmin proposes to create artificial intelligence based systems of tracking financial transactions, money input and output (Kuzmin, 2021). S. V. Rastoropov presents a review of such software in the sphere of preventing and detecting crime as ShotSpotter, Prepol, CloudWalkTechnology, HART, VAA, which are already successfully used in police activity (Rastoropov, 2020).

1.2. Organization of preliminary investigation

In this area, Yu. A. Tsvetkov, for example, suggests developing "an artificial managerial brain" capable of generating "optimal variants of solutions at all nods a criminal case trajectory" (Tsvetkov, 2021). M. A. Malina considers it possible to apply artificial intelligence technologies to detect and correct various distortions of the form of procedural documents, as well as to identify poor-quality and potentially unreliable information incoming to an investigation officer (Malina, 2021).

1.3. Criminological support of crime investigation

A good example is "Zerkalo" ("Mirror") software described in the article by D. N. Sretentsev and V. R. Volkova; it allows revealing the signs of intraframe editing of videos made by artificial neural networks which synthesize video images of people (deepfake) (Sretentsev & Volkova, 2021). An article by F. Rahman describes a research conducted at Syracuse University, where machine learning was used to classify and identify individual DNA profiles, as well as to analyze large amounts of complex data to reveal patterns some of which can be inaccessible to human analysis (Rahman, 2019). An article by Silva et al. (Silva et al., 2020) researches the possibility of using artificial intelligence to analyze images as evidences in criminal procedure.

1.4. Assessing evidences at pre-trial and trial stages

For example, A. V. Sibilkova assumes that the sufficiency of collected evidences can be estimated on the basis of machine learning of artificial neural networks of the results of criminal investigations of certain categories of cases, i. e. "artificial neural networks must obtain information about what was lacking to convict" (Sibilkova, 2019). As a model for introducing artificial intelligence into the system of justice, A. V. Makutchev sees its functioning "on equal terms, in cooperation with a judge" or substituting a judge with artificial intelligence (Makutchev, 2022). A work by A. A. Sumin and O. V. Khimicheva provides a good example of using artificial intelligence systems for assessing evidences at pre-trial stage in China (Sumin & Khimicheva, 2020). The problems and prospects of using artificial intelligence at that stage of a criminal procedure were also considered by foreign authors (Stoykova, 2023; Yassine et al., 2023; Amariles & Baquero, 2023).

The above brief review shows that the science of criminal procedure have long formed a rather optimistic approach to the issue of using artificial intelligence technologies in various spheres, including in criminal-procedural proving. However, this approach largely outstrips the actually existing artificial intelligence technologies, i. e. it can be stated that researchers mostly express their expectations and prognoses about the possibilities of using new technologies.

Undoubtedly, the use of new technologies in any of the above areas can only be welcomed. However, one should realize that there must be a clear and solid reason to introduce a certain technology into the criminal procedure. This is because a criminal procedure as an indispensible part of a legal procedure does not need any technologies; it is, so to say, self-sufficient. Is any technology needed to initiate a criminal case, collect evidences, submit them to the court where they will be considered and a decision on the merits will be made? Surely not. All this can be done even in the absence of pen and paper, exactly as it was done in the early human history.

Apparently, the areas of using artificial intelligence technologies touch upon all stages of the proving process in a criminal case. Some of them are used to collect evidences, serving in that instance as a tool of obtaining the evidence information in the hands of a subject of proving. Other technologies may be applied in checking and even assessing evidences.

Evidences and proving underlie all procedural decisions in a criminal case, directly influencing the rights and interests of the process participants. Thus, this is one of the most sensitive spheres of the criminal procedure. In the Russian legal tradition, proving is considered to "the core of criminal process" (Sheifer, 2022), "the centerpiece of all procedural activity" (Lupinskaya, 2023). Thus, from the viewpoint of the science of criminal procedure, it is important to define the place of artificial intelligence technologies, including in the future, in proving in a criminal case: should they be perceived exclusively as a tool with the help of which certain data relevant for the criminal case can be obtained, which can be shaped as evidences, or one may speak of the changes in the very nature of proving in a criminal procedure as it transforms from the sphere of human cognition into the sphere of machine cognition, where the role of a human being is reduced to just registering its results in a particular law-enforcement decision.

2. Artificial intelligence in the hands of a subject of proving

Using artificial intelligence technologies to obtain evidential information relevant for the criminal case implies a certain processing of the data contained in the source of evidence. Accordingly, there appears a risk of distorting or transforming this information, which may ultimately influence the reliability of the evidence per se (Stoykova, 2023). The subject of proving and the process participants must have a possibility to estimate how the said processing of information was taking place and make certain of its results.

2.1. Problems of collecting evidences using artificial intelligence technologies

One should agree about the main problems emerging at the stage of collecting evidences using artificial intelligence technologies, which were formulated by Eftychia Bampasika (Bampasika, 2021):

1. Inexplicability – the complexity of understanding the algorithms used by artificial intelligence leads to the impossibility of verifying or challenging such evidence. Indeed, if during evidence collection certain software based on artificial intelligence is used, for example, a facial recognition (identification) system or an image restoration system, then the algorithm underlying this product must be transparent and accessible for studying both by the subject of proving and the process participant.

2. Discrimination and bias – the information on which basis artificial intelligence makes a decision is not always complete and free of bias or distortions. That means that the set of data fed to, say, a neural network for "learning" must be accessible by the participants of the proving process, for them to have an opportunity to reveal any distortion or bias.

3. Lack of responsibility – the functioning of artificial intelligence is in any case based on the human activity which is not sufficiently regulated by law. The activity of creating and developing technologies allowing for collecting of evidences or information, on which basis evidences in a criminal case are subsequently formed, must be not only legislatively regulated but also meet the fundamental principles of a criminal procedure.

The above issues are actually worrying; therefore, any artificial intelligence technology used in a criminal procedure with a view of obtaining and collecting evidences must possess a set of properties which allows obtaining, as a result, evidence admissible from the viewpoint of criminal-procedural law.

2.2. Using artificial intelligence technologies in conducting expert assessments

In this aspect, an important position today belongs to using artificial intelligence technologies when conducting expert assessments. For example, using neural networks, based on machine learning, during expert research must be reflected in the research section of the expert's opinion.

An example of how the use of artificial intelligence technologies can be specified in an expert's opinion is an article by Alessandro Marrone and a group of biologists, which thoroughly describes the methodology of the research determining the bloodstains age by colorimetric analysis, including using five different machine learning approaches (Marrone et al., 2021). The researchers describe each of the machine learning approaches applied and the results obtained. One may easily see how the use of any other artificial intelligence based tool (like a neural network) should be similarly described when conducting a biological

expert assessment. This will allow estimating the content of the expert's opinion from the viewpoint of their reliability and, as a result, provide an opportunity to use these conclusions in proving in a criminal case.

Another example showing the use of artificial intelligence technologies in a criminal procedure as a tool for obtaining and collecting evidences is a deepfake technology. With its development, the accessibility and, accordingly, breadth of its use in criminal sphere will only increase. One may easily imagine using deepfake in banking or insurance fraud and other crimes of such kind. Hence, as early as today we should prepare a scientific basis for relevant expert research, which are, apparently, impossible without applying artificial intelligence tools. If a neural network can generate a fake video, then an expert must have available a no less effective neural network capable of recognizing such video. Hence, a symmetric answer to developing the deepfake technology must be development of a new methodology of portrait and videoscopic expertise taking into account the most vulnerable aspects of this technology, for example, such as the presence or absence of reflection in the eyes of the personages on video. As we have mentioned above, the Russian Ministry of Internal Affairs tries to develop such software in order to counteract the criminal deeds using deepfake. However, besides technical means, one should provide for the relevant methodological support of such activity.

As one can see, collecting evidences with the help of artificial intelligence technologies, provided this activity meets the requirements of openness, controllability, objectivity and is supplied with a relevant liability mechanism, fully complies with the principle of free evaluation of evidence (Article 17 of the Criminal-procedural Code of the Russian Federation[1]). It is worth noting that this is not about appearance of a new type of evidence in the criminal procedure or, as it is sometimes called, "electronic evidence". We fully share the opinion, expressed in science, that the types and forms of evidences stipulated by criminal-procedural law do not need expanding (Golovko, 2019). This is only about regulating the new means of obtaining and collecting evidences, which some researchers denote as "obtaining digital information through machine means" (Aleksandrov, 2018). We believe that the evidences obtained with the help of artificial intelligence technologies will possess the sign of admissibility, hence, can be used in proving in a criminal case.

3. The prospects of transforming the proving process

A rapid development of artificial intelligence technologies and an increasing digitalization of judicial procedures incite some researchers to a conclusion that artificial intelligence may become a subject of legal relations and be endowed with legal personality

[1] Criminal-procedural Code of the Russian Federation of December 18, 2001 No. 174-FZ. *Collection of legislation of the Russian Federation*. December 24, 2001, No. 52 (part I). Article 4921.

(Papysheva, 2022) or even can substitute a judge (Kolokolov, 2020). This position might be exceedingly optimistic and even to some extent futuristic, but it is not unreasonable. As a matter of fact, the problem of a judicial decision approximating the objective truth and the related search for effective means and mechanisms which could exclude or minimize a judicial error occupies the minds of the Russian researchers in criminal-procedural science so much that they are eager to grasp any, even a purely hypothetical, opportunity to solve it. In that instance, the artificial intelligence tools which, as is broadly advertized, "allow solving some humanly impossible tasks", "exclude the influence of a human factor in problem solving", "accelerate the decision-making process", naturally become a rather attractive object to build hypotheses about the directions of a criminal procedure development.

One more reason for researchers to turn to artificial intelligence technologies is unpredictability of judicial decisions, especially as regards trial by jury. According to the Criminal-procedural Code of the Russian Federation, the jurors are not obliged to explain their verdict, which does not allow the parties to assess the relevance of such decision and understand how and around what the judgments of the jury were built. Because of that, jury decisions are often perceived as arbitrary, detached from the proving process.

Besides, none of the process participants, including a professional judge, may influence their decision, the more so participate in their deliberation. Left alone with a question sheet, without special training in proving in a criminal case, but having got instructions from a professional judge as to the necessity to interpret all reasonable doubts in favor of the defendant, the jurors have to turn to their experience and the skills of reflections and logical deductions formed in their lifetime.

As a result, in a case where evidences included videos from a fuel station with an armed assault and testimonies of victims vividly describing the events, the jury may come to a conclusion of the absence of a criminal act and pronounce for the defendants[2]. In another case, where evidences included experts' opinion about the presence of a defendant's DNA on the crime scene and personal belongings of the murdered victims at the defendant's home, the jury may come to a conclusion of the defendant's noninvolvement and also pronounced for them[3].

Undoubtedly, if it were possible to ask the jurors why they came to such decisions, they would probably explain that the evidence presented to them was simply insufficient to conclude that the charges had been proved. This could largely clarify the connection

[2] Case No. 2-3/2020, heard by Stavropol regional court. Available at: https://kraevoy--stv.sudrf.ru/modules.php?name=sud_delo&srv_num=2&name_op=case&case_id=30809862&case_uid=bbd2dd35-a6f1-4f7b-a158-18a71eefa38f&delo_id=1540006

[3] Case No. 2-4/2021, heard by Stavropol regional court. Available at: https://kraevoy--stv.sudrf.ru/modules.php?name=sud_delo&srv_num=2&name_op=doc&number=23537753&delo_id=1540006&new=0&text_number=1

between the verdict and the evidences and would remove the question about the perceived justification of the verdict.

In this situation, when the motifs of the decision made by the subject of proving are concealed for us, the natural question is: do mathematical methods underlying any artificial intelligence technology allow improving the proving process in a criminal case, so that it resulted in a just ruling of the court, maximally approximated to the objective truth? What if every evidence in a criminal case was attributed a certain weight and a neural network was taught to assess these evidences and build certain conclusions based on them?

When answering these questions, on should first of all turn to the essence of the principle of free evaluation of evidence described in Article 17 of the Russian Criminal-procedural Code, which consists, inter alia, in the absence of a preset power of evidences and prohibition of any grading them by quality (Golovko, 2017). When we set precise values to each piece of evidence for the algorithm and suggest it making an evaluative conclusion on that basis, we disregard that the criminal-procedural proving, although being a type cognitive activity, has cardinal differences from other types of cognition. Therefore, formalization of evidences through attributing a certain weight to them, even for the sake of a mathematical algorithm functioning, contradicts the fundamental principle of the criminal procedure. Here one should agree with M. A. Malina in the negative estimation of such an approach to using artificial intelligence technologies in proving in a criminal case (Malina, 2021).

Are there alternative way or one should unequivocally and ultimately reject an idea of transforming the proving process through using artificial intelligence technologies?

Fortunately, there is always an alternative. For example, one of the world leading specialists in evidentiary law, revered Professor Ronald J. Allen, convincingly demonstrated as early as in 2001 that it does not work applying such mathematical methods of estimating probabilities as Bayes theorem to proving in a criminal process and suggested a theory of relative likelihood (Allen, 2001). In a later work, developing this idea, he stated that evidences would be more convincing when they confirm a conclusion about a single hypothesis (for example, this person committed a crime) compared to a competing theory (for example, the crime was committed by someone else), and weaker when they do not exclude probable alternative hypotheses based on alternative suggestions (Allen & Pardo, 2007).

If one looks through the prism of these ideas at the proving process in a jury trial, it becomes obvious that it is just like that: the parties try to convince the jurors that their version of circumstances of the case is more probable. It is on the estimation of probability of evidences that a judge instructs the jury in the opening statement, asking them in the analysis of evidences to interpret in favor of the defendant only reasonable doubts, i. e. those which can be explained, which are based on common sense, not on a biased opinion, suggestions, imagination, sympathy or antipathy, desire to cater for public opinion or meet the expectations of friends, on emotions or fantasies.

Hence, if one considers the possibility of using artificial intelligence technologies at the stage of checking and evaluating evidences, then only through the algorithms based on the theory of relative likelihood. Otherwise we turn on the violation of the principle of free evaluation of evidence.

Can the existing artificial intelligence technologies perform the function of evaluating evidences at the same level as non-professional judges – the jurors? Apparently not. Such a mathematical method has not been developed yet. Hence, it is so far premature to speak of a legal personality of artificial intelligence in the process of criminal-procedural proving.

However, looking into the future with a hope to improve the process of proving, including in the jury trial, the science of criminal procedure should first of all turn to mathematicians. Only elaboration of mathematical methods for analyzing evidences in a criminal case will allow passing from using artificial intelligence technologies exclusively as a tool in the process of obtaining and collecting evidences to forming a new process of proving, in which artificial intelligence will be able to play a cognitive role. How soon it will happen, and whether it will happen at all, time will tell.

Conclusions

The optimistic approach to evaluating the possibilities of using artificial intelligence technologies in a criminal procedure, established in the science of criminal procedure, significantly outstrips the actually existing technologies, i. e. is based on expectations and prognoses. The actual application of the said technologies takes place only in certain spheres of the criminal procedure. Nevertheless, the continuing development of artificial intelligence allows speaking of an inevitable broadening of its spheres of application, including in the process of proving in criminal cases.

The most realistic scenario of using artificial intelligence technologies in the proving process is their use in obtaining and collecting information of evidentiary significance, which may further be structured as evidence in a criminal case. Using artificial intelligence as a tool when collecting evidences must meet such requirements as openness, controllability, objectivity and provision with a relevant liability mechanism. In that instance the evidences obtained with the help of artificial intelligence technologies will possess the sign of admissibility.

Evaluation of evidence with the help of mathematical algorithms in which preset values of quality of each piece of evidence are used, contradicts to the principle of free evaluation of evidence in a criminal procedure. Applying the artificial intelligence technologies based on mathematical algorithms in criminal-procedural proving is only possible under the condition of compliance with the said principle, i. e., for example, on the basis of the theory of relative likelihood of evidences. Hence, it is now premature to say that machine cognition may become the content of criminal-procedural proving.

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Технологии искусственного интеллекта в уголовно-процессуальном доказывании

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уголовный процесс,
цифровизация,
цифровые технологии

Аннотация

Цель: обобщение и анализ сложившихся в уголовно-процессуальной науке позиций к применению технологий искусственного интеллекта, выработка авторского подхода к перспективам трансформации уголовно-процессуального доказывания под влиянием технологий искусственного интеллекта.

Методы: методологическую основу исследования составляет единство всеобщего, общенаучных и специально-юридических методов правовой науки, в том числе абстрактно-логического, сравнительно-правового и прогностического.

Результаты: определены основные направления применения технологий искусственного интеллекта в уголовном процессе, такие как профилактика и выявление преступлений, организация предварительного расследования, криминалистическое сопровождение расследования преступлений, оценка доказательств на досудебной и судебной стадиях. Автор приходит к выводу, что сложившийся в науке уголовного процесса достаточно оптимистичный подход по данному вопросу значительно опережает реально существующие в настоящее время технологии искусственного интеллекта. Выявлены основные требования, которым должна отвечать деятельность по применению искусственного интеллекта при сборе доказательств по уголовному делу. Обращено внимание на проблемы применения технологий искусственного интеллекта при проведении судебных экспертиз, которые требуют совершенствования методологии судебно-экспертной работы. Рассмотрен вопрос о перспективах трансформации процесса уголовно-процессуального доказывания в условиях внедрения технологий искусственного интеллекта. Обосновывается вывод, что оценка доказательств с помощью математических алгоритмов, в которых применяются заранее установленные значения качества

каждого доказательства, противоречит принципу свободы оценки доказательств в уголовном процессе. Автор приходит к выводу об отсутствии в настоящее время достаточных оснований для наделения искусственного интеллекта субъектностью в процессе доказывания.

Научная новизна: в работе предпринята попытка рассмотреть место искусственного интеллекта в уголовно-процессуальном доказывании, выявлены требования, которым должно соответствовать применение этой технологии при сборе доказательств, при этом проанализированы перспективы трансформации процесса доказывания с учетом внедрения технологий искусственного интеллекта.

Практическая значимость: основные положения и выводы исследования могут быть использованы для совершенствования механизма правового регулирования технологий искусственного интеллекта в уголовном процессе.

Для цитирования

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