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Comparative analysis of the use of AI as expert evidence

1. Introduction

In the recent years, the science of criminal procedure law has been actively discussing issues of the possibilities of using Artificial Intelligence (AI). The concept of "Artificial Intelligence" (AI) has not been embedded into the legislation but is represented in terms of scientific theories, techniques and methods that have one thing in common – namely, to replicate human cognitive abilities using a computer.[1] As one scholar presciently observed, to think about the future is largely to talk about the creeping scientisation of factual inquiry.[2] Today, this creep is pouring out in a flood, as legal scholars from a variety of disciplines struggle with questions related to science in the justice system.[3]

This study explores and examines the diffences of the adversarial and inquisitorial evidentiary systems, and AI experts and human experts highlighting the issues related to the use of AI in the courtrooms. The analysis is also placed in a broader context and discusses the threats and opportunities of using AI. The main concern of this article is how Artificial Intelligence will fit in as "experts" giving expert evidence.

The importance of the issue is that the mental processes involved in decision making remain an opaque feature at the heart of the legal discourse.[4] And even experts called

[1] Sushina, Tatyana – Sobenin, Andrew: *Artificial Intelligence in the Criminal Justice System. Leading Trends and Possibilities*. In: Advances in Social Science, Education and Huanities Research. Atlantis Press, Dordrecht, 2019. 432. DOI 10.2991/assehr.k.200526.062 (2023.04.11.)

[2] Damaška, Mirjan R.: *Evidence Law Adrift*. eBook. Yale University Press, New Haven, 1997 143. https://www.jstor.org/stable/j.ctt32bnj3 (2023.04.11.)

[3] Murphy, Erin: The New Forensics, Criminal Justice, False Certainty, and the Second Generation of Scientific Evidence. *California Law Review* vol. 95 (2007) 73. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=896128 (2023.05.05.)

[4] Simon, Dan: A third view of the black box. Cognitive coherence in legal decision making. *University of Chicago, Law Review* 71 (2004) 511. https://chicagounbound.uchicago.edu/cgi/viewcontent.cgi?article=5261&context=uclrev (2023.04.11.)

upon to explain machine evidence in court encounter limitations in their ability to comprehensibly explain how an AI-driven device evaluates for example a human or demonstrate a clear chain of causality.[5] These problems constitute the "black box problem" in machine evidence that researchers are currently investigating.[6]

Machine evidence, like other forms of technology that came before, has the potential to provide new sources of information and, thus, a chance for more accurate fact-finding in criminal trials. However, there is a price to pay for the use of technology that has inherent black-box problems. That is, the inability to explain a particular result. Judges will have to decide whether to trust AI-generated testimony that can only be partially explained by experts, making an already complex decision-making system even more uncertain.

Courts should be sceptical as AI becomes embedded in future generations of forensic tools. Given that AI was developed as a solution to a consumer need and was not intended to be used as a forensic evidence tool, AI-generated machine evidence in consumer products presents new challenges. It may initially seem unlikely that the increased use of AI in our daily lives would lead to an increase in the importance of machine evidence in establishing facts in criminal trials, particularly given the reluctance of courts in the past to use all available technologies (e.g. polygraphs), but continued technological development may lead to change. As AI becomes more widespread, and if such technology is seen as an accurate assessment of human behaviour, more people may be willing to accept it as a reliable and trusted source of information. Despite this possibility, it remains uncertain whether and how such information would be admissible in court.[7]

In general, the rules governing the admission of third-party evidence are based on the need to assist the judge in matters outside their expertise. Countries such as the United Kingdom and the United States have taken a step forward in the age of technology with the use of artificial intelligence (AI) to provide expert evidence.[8] I believe that analysing the differences between the adversarial and inquisitorial systems also helps us to better understand why this happened.

Reviews suggesting that some criminal justice systems have disturbing and previously unrecognised limitations in their ability to credibly use and regulate forensic science evidence have been remarkably critical, and we can see this in relation to AI as expert evidence too. The historical failure of comparative and other evidence scholars to consider the value and limitations of forensic science evidence has led to highly artificial, indeed largely abstract and sterile, debates about the value of particular procedures and safeguards.

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[5] GLESS, Sabine: AI in the courtrooms. A comparative analysis of machine evidence in criminal trials. *Geogetown Journal of International Law* vol 51. (2020) 211. https://papers.ssrn.com/sol3/papers. cfm?abstract_id=3602038 (2023.04.11.)

[6] Id. 211.

[7] GLESS, 2020. 207-208.

[8] MAHALI, Mazlina et al: Artificial intelligence as expert in the future. Issues and challenges under Section 45 of the Malaysian Evidence Act 1950. *1 LNS (A)* (2022) 1. https://www.researchgate.net/ publication/358995881 (2023.03.11.)

These debates tend to be about the value of truth over process, human rights, resources, the training, experience and selection of lawyers, judges and jurors, and the effectiveness of safeguards such as confrontation, judicial direction and appellate review. The terms fact finder and tribunal are used interchangeably.

By studying and better understanding the different types of justice systems, it is possible to better position the eventual use of AI as an expert and conclude recommendations as AI and machine evidence are likely to proliferate.

2. Evidence and evidentiary system

Evidence in criminal proceedings is the knowledge of the past event when we infer the cause from the result[9] Evidence is the only legal method of establishing the facts in the process of criminal prosecution.[10] In the case of obstacles to reconstructive evidence, the investigation must be discontinued or an acquittal must be pronounced, in accordance with the in dubio pro reo rule, doubts are to be assessed in favour of the accused. Evidence is as important to the investigating authority as it is to the court, and the role of expert opinion is of paramount importance in the investigative phase of criminal proceedings.

The law of criminal procedure therefore defines the means of knowledge and evidence, regulates in detail the method of obtaining them, and also defines the limits that must be observed in the interest of legality.

The purpose of evidence is to reach a judgement on the basis of facts, data and evidence. In the context of criminal proceedings, proof means establishing the commission of a crime, identifying the perpetrator and establishing criminal liability on the basis of facts and data, in a manner regulated by law. Its tools, methods and systems have undergone many changes,[11] its order, course, framework and instruments are regulated by law, and the observance of its norms is a legal obligation of the acting authorities. In the process of establishing the truth, we understand it more as a synonym for reality, i.e. it is necessary to find out what actually happened. Of the events that took place, only those facts and data that have been filtered and evaluated by the law and classified as essential by the legislator become significant.

During the evidentiary process, two closely related main questions, i.e. a question of fact and a question of law, have to be proven, therefore the evidence is limited to a part of reality, namely the evidence of legally relevant facts. The right of evidence includes the presentation of the means of evidence and their presentation to the court, the conduct of the evidentiary procedure, the evaluation of the result of the evidence and the stage of drawing

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9   FINSZTER, Géza: *Valósághű tényállás, avagy az anyagi igazság megállapítása* (A realistic statement of facts, or the establishment of the material truth). In: Madai, Sándor– Pallagi, Anikó – Polt, Péter (szerk.): Sic itur ad astra. Ünnepi kötet a 70 éves Blaskó Béla tiszteletére (Festive volume in honor of 70-year-old Béla Blaskó). Ludovika Egyetemi Kiadó, Budapest, 2020. 188.

10   CSÉKA, Ervin: *A büntető ténymegállapítás elméleti alapjai* (Theoretical foundations of criminal fact-finding). KJK, Budapest, 1968. 122.

11   FARKAS, Ákos – RÓTH, Erika: *A büntetőeljárás* (The criminal procedure). Wolters Kluwer, Budapest, 2019. https://doi.org/10.55413/9789632959054 (2023.02.07.)

conclusions from the evidence, the subsumption. Evidence is therefore a procedural or substantive right, depending on whether the evidence is of a dynamic nature, i.e. procedural, e.g. the appointment of an expert, the hearing of an expert, or the material aspect of a static nature, i.e. with little or no external appearance, e.g. the consideration of expert opinions.

The evaluation of evidence also determines the various normative contents of evidentiary procedures, which aim at the primacy of formal, personal truth, expecting the discovery of reality and ensuring objective justice. The attainment of objective truth – through expert evidence – requires active judicial cooperation in the context of substantive litigation. On the other hand, the procedural order, which asserts the primacy of formal justice, does not deprive the parties of their right of disposal, excludes judicial arbitrariness and requires the enforcement of the role of the fair procedure in protecting the legal order, with a basically passive judicial behaviour limited to formal litigation.[12]

Evidence in criminal proceedings is a borderline area that is closely related to everyday knowledge, but also has the characteristics of professional and scientific knowledge.

The subject of knowledge is the court and its purpose during criminal proceedings is the verdict, which can only be based on proven knowledge,[13] but the whole of evidence cannot be considered as a simple process of knowledge.[14]

The task of criminal proceedings is to establish the truth, but not at any price.[15] It is a question of proof and certainty whether the legally relevant criminal past can be established in a judicial procedure with procedural guarantees.

3. Justice systems

When examining the difference of the justice systems we understand better why the United States produced the most critical responses to the institutionalized forensic sciences and their evidentiary products and what this might suggest about comparative legal „advantages", also understanding the legal limits of our systems when introducing AI as expert evidence, taken into consideration exogeneaous knowledge too that is beyond law.

The procedural system is a set of operational and structural principles of legal proceedings that determine the main functions of the proceedings, as well as the rights and obligations of the subjects of the proceedings.[16]

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[12] Id.

[13] Fenyvesi, Csaba – Herke, Csongor – Tremmel, Flórián: *Új magyar büntetőeljárás* (New Hungarian criminal procedure). Dialog Campus, Budapest–Pécs, 2004. 211–230.

[14] Tremmel, Flórián: *Bizonyítékok a büntetőeljárásban* (Evidence in criminal proceedings). Dialog Campus, Budapest–Pécs, 2006. 33.

[15] Király, Tibor: *Büntetőítélet a jog határán. Tanulmány a perbeli igazságról és valószínűségről* (Criminal judgment on the border of the law. Study on the justice and probability in litigation). KJK, Budapest, 1972. 139.

[16] Bérces, Viktor: A büntetőperbeli bizonyítás alapfogalmainak dogmatikai megközelítései a hazai jogtudományban (Dogmatic approaches to the basic concepts of evidence in criminal proceedings in Hungarian jurisprudence). *Iustum Aequum Salutare* XIV. 1 (2018) 19-32.

But to be more precised the various criminal procedures[17] can be divided into three basic systems. These are the inquisitorial, the accusatory[18] and the mixed systems of evidence, which are beyond the scope of this study.[19]

Inquisitorial proceedings are characterised by a search for substantive truth (what actually happened), whereas accusatorial proceedings are characterised by a search for procedural truth (what I can prove in court). Inquisitorial proceedings are therefore necessarily preceded by a lengthy investigation, even if there is a perpetrator from the outset, because the accuser must go before the judge with the facts of what he or she believes actually happened. The burden of proof in inquisitorial proceedings is no different today. Cases are brought to trial where the prosecution believes, with a degree of certainty that is much greater than mere suspicion, that it has accused a „good" defendant of a real crime (but no longer requires a confession).

In an accusatorial proceeding, things are typically decided at trial, where, on a hiding or seeking basis, you either succeed or fail in proving the offence. Appeals are mainly possible in cases of procedural violations. It does not matter if the conviction is unfounded, i.e. the facts were not sufficiently proven. The procedural truth is established in this trial. In an inquisitorial procedure, on the other hand, the police themselves first try to establish the full truth during the investigation.

The accusatory system usually begins with a complaint, and the procedural functions of accusation, defence and judgment are separated. The accused has the same rights as the accuser; the task of the court is not to reveal the facts of the case in a realistic way, but only to establish a formal truth. The trial is based on the principles of openness, directness, orality and adversarial procedure[20] In the inquisitorial system, proceedings are usually initiated ex officio and the procedural functions are not separated. The accused is typically the „subject" of the proceedings, his rights are not defined within an institutional legal framework, and his testimony is considered the primary evidence. The role of the courts in this system is to establish the facts as precisely as possible, i.e. to find the material truth, the proceedings are based on the principle of secrecy and writing, and there is no substantive legal argumentation.

The mixed systems of procedure, which form the basis of most of today's codes of criminal procedure, developed in the wake of the Napoleonic Code of Criminal Procedure of 1808 and during the French wave of codification. The investigative profession is inquisitorial, the judicial profession accusatory. The role of the judge is active in the trial, its purpose being to establish the material truth in accordance with the appropriate procedural rules for the acquisition of knowledge and in a way that provides procedural

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[17] Id. 11.

[18] Esmein, Adhemar: *A History of Continental Criminal Procedure. With Special Reference to France.* Little Brawn and Co, Boston, 1913. Cite: Farkas Ákos – Róth Erika: A *büntetőeljárás* (The criminal procedure). Wolters Kluwer Hungary Kft., Budapest, 2019. https://doi.org/10.55413/9789632959054, (2023.02.07.)

[19] Farkas–Róth, 2019.

[20] Mezey Barna (szerk.): Magyar jogtörténet (Hungarian legal history). Osiris, Budapest, 2001. 357.

guarantees for the possibilities of defence against errors in the administration of justice. The conceptual and practical system of procedural evidence depends on the characteristics of the given legal system, for example the type of evidence systems. There are also logical systems of proof.

The American system of criminal prosecution is an accusatorial system, meaning the government, after accusing the defendant must prove its allegations by an adversary process. An adversary process is one in which each side (the prosecution and the defense) presents its most persuasive arguments to the judge or jury. An adversarial system, as typically the justice system of the United States is that where the court act as a referee between the prosecution and the defence. The whole process is a contest between two parties. As regard crime these two parties are the state and the person accused. In this process court plays an independent role.

An inquisitorial system, just as the Hungarian Criminal Procedure, is a legal system where the court is actively involved in proof of facts. In criminal proceedings, the court, the prosecution and the investigating authority shall base their decision on realistic facts. It is the task of the court to establish the truth, and to establish the material truth, which may be very different from the realistic truth.[21] The material truth and the procedural truth may be completely different.[22]

In the judgement, the court clarifies the facts within the framework of the charge. It is not necessary to prove facts which are generally known, which are officially known to the court, the prosecutor's office or the investigating authority, or the reality of which is jointly accepted by the plaintiff, the defendant and the defence in the given case.[23]

4.   Expert evidence and fact finding in different systems

Adversarial proceedings have the advantage of partisan vetting, which gives both sides the opportunity to challenge consumer products offered as witnesses. By contrast, inquisitorial systems have specific mechanisms in place to introduce expert evidence recorded outside the courtroom, including to establish facts, which will be necessary to thoroughly test AI.[24]

Scrutiny in fact-finding is much more complex in an adversarial system, where there are a plethora of ways to test the credibility and reliability of evidence, and where scholars have already suggested solutions for new generations of digital evidence.[25]

From a comparative legal angle, that neither the inquisitorial systems prevalent on the European continent, nor the adversarial system used in the United States, are prepared for AI in the courtroom and thus cannot take advantage of potentially relevant machine evidence.

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[21] Finszter, 2020.

[22] Elek, Balázs: A bírói meggyőződés és a megalapozott tényállás összefüggései (The relationship between judicial conviction and established facts). *Jura* 1 (2014) 40-50.

[23] Kuhl, Andrea: Az ítéleti bizonyosság és a szakvélemények értéke (Expert evidence and the criminal justice system). *Miskolci Jogi Szemle*, 2023, 18(1), 90-110. DOI 10.32980/MJSz.2023.1.9

[24] Gless, 2020. 195-196.

[25] Murphy, 2007. 721.

While inquisitorial systems have struggled to find adequate defense tools to combat this new form of information, adversarial systems have few feasible means of including out-of-court tests documenting a thorough vetting of AI-driven devices. Significant changes should be considered to both systems in anticipation of courts across the world being faced with evidence generated by AI and argues for an approach that draws from both adversarial and inquisitive legal systems. This would include the adversarial systems' tools to thoroughly scrutinize evidence in a partisan setting and the inquisitorial systems' allotment of the time and space needed to assess complex technical evidence outside the courtroom, and its sharing of knowledge among all parties in a case file.[26]

With each additional layer of digital complexity, access to relevant information becomes more difficult and requires expertise that the trier of fact might not possess. Additional issues arise from laws regulating the reliability and credibility of evidence which impact not only the admissibility of evidence (a key tenant of adversarial proceedings), but also its weight (a particularly important aspect in establishing facts in the inquisitorial model).[27]

In an adversarial system, expert witnesses are typically called by parties, based upon their certification, skills, or experience, to testify before a judge or jury to assist their case. In an inquisitorial system, expertise is sought by the bench where they have determined that they lack the relevant knowledge; expert testimony is generally given orally during the public hearing but can also be provided in written reports. Regardless of whether the fact-finders are jurors or members of a bench, understanding the issues around the reliability of devices that autonomously make assessments and that may (or may not) be useful in reconstructing the facts of a case exceeds the knowledge and understanding of an average human. As such, the use of complex technology in fact-finding makes expert evidence crucial in both adversarial and inquisitorial justice systems.[28]

While scholars in adversarial systems (especially in the United States) are increasingly denouncing blind faith in this opaque machinery, citing misidentifications through DNA tests in the 2000s, an equally pronounced debate has not surfaced in Europe.

Certainly, both legal systems share similar rules around the foundation required for trustworthy fact-finding, including independent and impartial judges and formal requirements around evidentiary proceedings. Despite this shared foundation, adversarial and inquisitorial trial use very different procedural approaches.[29] These differences result most notably from a divergence in the fact-finding body, which is a bench comprised of judges and laypeople in the inquisitorial system and a judge or jury in the adversarial system. This disparity shapes evidentiary rules, including how statements are used in establishing facts and the necessity of a reasoned verdict that can withstand an appeal.[30]

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[26] Gless, 2020. 199.

[27] Id 211.

[28] Id 212.

[29] Id 219.

[30] Damaška, 1997. 14.

Both jurisdictions' common goal of pursuing the truth (albeit procedurally different), combined with their apparent endorsement of AI-driven devices, results in an interesting comparative study. Experts are crucial to the use of machine evidence in a criminal trial. They must capture and clarify how particular data is registered in addition to explaining the impact of a particular machine learning device and its possible sources of error relevant to fact-finding. In an adversarial proceeding, expert evidence is commonly used as part of the partisan presentation of a case, whereas during an investigation in an inquisitive system, the prosecutor will typically commission experts and subsequently add their reports to the case file.[31]

The Continental European legal system has been, influenced by adversarial notions since the 1950s as a result of case law from the European Court of Human Rights (ECtHR), the prominent human rights tribunal based on the European Convention on Human Rights (ECHR). In particular, the notion of a fair trial, including the right to examine incriminating evidence (Art. 6 ECHR) has had a lasting effect on fact-finding in Continental Europe and often serves as a sort of backup if the traditional inquisitorial system lacks adequate protection for the individual.[32]

Article 6 ECHR and its "equality of arms" concept, while seemingly adversarial, has been said to be grounded in both civil and common law traditions and is a consequence of the ECtHR's attempt to create a cross-jurisdictional notion of procedural fairness, seeking to achieve "knowledge parity".

Common in both adversarial and inquisitorial systems that allowing Artificial Intelligence technology as an expert witness, may violate for example the right to a fair trial guaranteed by Article 6 of the ECHR. According to Article 6 of the ECHR, a fair trial includes the right to a fair trial and the right to defend oneself; as a result if AI technology becomes the expert witness, defendants will not have the same opportunity to challenge the accuracy of the evidence presented against them.[33]

As of today, AI-driven devices cannot undergo the equivalent of cross-examination, if such AI is used as evidence, it should be subject to scrutiny, especially with respect to the design, algorithms, and machine learning/training data.

A comparative analysis of the inquisitorial and adversarial criminal justice systems revealed that there are new evidentiary problems should machine evidence enter the courtroom and that there may not be one single solution. Traditionally, both the inquisitorial and adversarial systems have addressed difficulties in maintaining trustworthy fact-finding by pointing out human errors in the evidentiary procedure. Both systems will have to modify their approach if they seek to introduce AI as expert evidence into criminal proceedings. In some ways, the conclusion is the same in both jurisdictions: AI's unique status must be acknowledged and the message it conveys needs to be made visible to the parties, the court, and the public.

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[31] GLESS, 2020. 220.
[32] EDMOND, 2014. 231.
[33] MAHALI, 2022. 9.

Artificial Intelligence technology is now at the height of human expertise. The legal system around the world has begun to authorize the use of Artificial Intelligence as an expert witness in court. This can be seen in the United States, where Artificial Intelligence technology is considered an expert and its testimonyis admissible under FRE 702.[34]

Moreover, machine learning proofs have also been found to satisfy the principles set out in the Daubert vs. Merrell Dow Pharmaceuticals, where the United States Federal Court has adopted this standard to prove „reliable principles and methods" for expert testimony under FRE 702. However, it should be noted that the admissibility of evidence remains subject to each state's rules of evidence.[35]

There are still controversies over whether the court would accept expert witness testimony in the form of artificial intelligence technology. One of the questions raised in the United States is whether the data collection method produced a biased sample that could affect the relevance of the current question.[36]

5. Conclusions

Artificial Intelligence as a forensic tool might be considered as third generation evidence. AI to perform as intended has been recorded at a percentage ranging from 10% to 29%.[37] This is not surprising since it is the common role of Artificial Intelligence to act on demand instead of responding to the expectations of human beings.[38]

Human judgement, the subject, cannot be replaced by anything in the search for truth. In all cases, material truth must be included in the determination of the historical facts governing criminal liability; probability based on any unknown or un-verified algorithm may not be sufficient. Just as experts coming from a wide variety of expert fields, AI is very sector-driven and the understanding of the use of special knowledge necessitates further expert knowledge and verifications. Given that AI and the used data and algorithms are being sector-specific, a mix of adversarial or inquisitorial elements needs to be defined and customized depending on the type of AI used and the cases necessitating further studies and legal regulation.

Some of the AI types used might fit better into an inquisitorial system, while others would support the truth better in adversarial systems. For example in the field of identity or authenticity of handwriting or fingerprint, which area uses pattern recognition systems giving accurate result in identifing similarities and differences, might be more established in an inquisitorial system.

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[34] Id. 10.

[35] Nutter, Patrick W.: Machine learning evidence. Admissibility and weighting. *Constitutional Law Journal* 21(3) (2019) 919–958. https://scholarship.law.upenn.edu/jcl/vol21/iss3/8 (2023.04.28.)

[36] Mahali, 2022. 8.

[37] Dinsmore, Thomas: *Is Ai failing?* Blog article on web page. https://thomaswdinsmore.com/2020/01/14/is-ai-failing (2023.05.3.)

[38] Tegmark Max: *Advantage & Risk of Artificial Intelligence.* https://futureoflife.org/background/benefits-risks of-artificial-intelligence (2023.05.09.)

The main concern for AI to be included as an expert in the future is the relevance and admissibility provisions themselves. If the problem of integrating sector-specific machine evidence into the establishment of facts in criminal trials were to be approached from a technical point of view (requiring technology to serve the law), the adversarial and inquisitorial systems would face the same, albeit monumental, challenges.

Whether or not AI becomes a new evidentiary tool – as with any new type of evidence – we need to ensure the trustworthiness of the fact-finding process when machine evidence is used in criminal proceedings. The pace of technological progress and the challenges it poses are best addressed through mutual learning between adversarial and inquisitorial justice systems. No evidence system is perfect, but the adversarial system prides itself on its strength, flexibility and willingness to experiment with new approaches.[39]

Regardless to the justice system types, it is essential, both for the effectiveness of the exercise of defence rights and for the transparency of national criminal justice systems, that a specific, clear and precise legal framework regulates the conditions, modalities and consequences of the use of AI tools in the field of law enforcement and the judiciary. Independent assessment, algorithmic data transparency and oversight is needed. The use of AI applications must be prohibited when incompatible with fundamental rights, it should be in accordance with the Charter and the EHCR.

The sovereign discretion of judges and case-by-case decision-making must be upheld; and the use of AI and related technologies that suggest judicial decisions should be prohibited.[40]

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[39] Damaška, 1997. 151.

[40] European Parliament 2019-2024, TEXTS ADOPTED P9_TA (2021)0405: Artificial intelligence in criminal law and its use by the police and judicial authorities in criminal matters, European Parliament resolution of 6 October 2021 on artificial intelligence in criminal law and its use by the police and judicial authorities in criminal matters (2020/2016(INI)) https://www.europarl.europa.eu/doceo/document/TA-9-2021-0405_EN.pdf 6-8. (2023.05.03.)