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The Possibility of Using Artificial Intelligence in the Process of Composite Sketching

Możliwość wykorzystania sztucznej inteligencji w procesie tworzenia kryminalistycznych portretów pamięciowych

ABSTRACT

The article aims to present the latest technological achievements in the context of the possibility of their use in supporting detection activities carried out by law enforcement authorities. The dynamic development of exact sciences, including computer science, is one of the determinants of the pace and direction of development of forensic science. It has a direct impact, i.a., on the rules of making a composite sketch of an unknown perpetrator of the crime, an art known since ancient times. Through a review of the recent literature, the author aims to present the possibilities of using artificial intelligence (AI) in the process of creating a visual representation of the body, and in particular the appearance of the face, of an unknown perpetrator. Moreover, the article attempts to precisely determine the legal nature of the act of making a composite sketch.

Keywords: artificial intelligence; AI; homicide; composite sketch; forensic science

INTRODUCTION

It is of paramount importance for the bodies that carry out activities aimed at detecting an unknown perpetrator, apart from determining offender's mental profile,

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to reconstruct perpetrator's physical appearance, i.e. the external features enabling its visualisation. While the determination of the mental characteristics of the perpetrator is made mainly on the basis of thought processes, numerous inferences based on the results of a broadly understood examination of the crime scene or the use of the results of analyses undertaken by those who perform criminal profiling, the prediction of a person's appearance is based on a completely different catalogue of activities. It includes a specific synergy of tactical-forensic indications as to the conduct of individual activities focused on personal sources of information, as well as latest achievements of technology and natural sciences.

This is the best proof to confirm the correct and still valid idea put forward by T. Hanausek, who considered forensic tactics and techniques as two equal and complementary branches of forensics, neither of which can exist independently.[1] It should be noted that, in the opinion of practitioners, both psychological profiling and reconstructing the physical appearance of the perpetrator are of equal importance, as only when taken together do they guarantee the possibility of precisely narrowing down the circle of persons who may be the alleged perpetrators of the crime, including in particular homicide.[2] There should be no doubt that knowledge about a person's appearance significantly improves the investigation process. Therefore, this article presents a method that the author considers promising in supporting forensic processes of visualising the appearance of a hypothetical, as yet undetected, perpetrator of a criminal offence.

REPRODUCTION OF HUMAN APPEARANCE BASED ON MEMORY TRACES

1. Introductory issues

The process of remembering, storing in memory and then reconstructing the features of human appearance was an issue that both in the pre-forensic period and after the emergence of forensic science as an independent discipline, occupied the attention of people associated with crime combating in the broadest sense, and in particular those who tried to develop the most precise methods of presenting the features that distinguish a potential perpetrator from the general population. Since the dawn of time, the importance of eyewitness accounts has been recognised not

[1] T. Hanausek, *Zarys kryminalistycznej teorii wykrywania*, part 1: *Pojęcie i przedmiot wykrywania sprawców przestępstw*, Warszawa 1978, pp. 20–21. Similarly J. Kasprzak, B. Młodziejowski, W. Kasprzak, *Kryminalistyka. Zarys systemu*, Warszawa 2015, pp. 30–31.

[2] B. Cader, J. Gruba, J. Gurgul, T. Hanausek, *Anna*, part 3: *Praca wykrywcza*, Warszawa 1981, p. 114 ff.

only in terms of presenting the course of the incident, but also in gaining knowledge about the individual characteristics of the perpetrator of the crime.

As emphasized in the current psychological literature, the content memorized and stored in memory is reproduced by re-updating or activating acquired reactions. The very reproduction of this content takes place in one of two variants: recall or recognition. Recognition is considered to be an easier form of reproducing material stored in memory, as it involves identification of a stimulus or situation that previously occurred with the situation or stimulus being experienced.[3] Recall, on the other hand, is a selective and creative process, in which a person reproducing the content he or she has remembered recalls them without actually perceiving it or even without any stimulus affecting that person. It is this type of reproduction of material stored in a person's memory that has been used during questioning, including in the field of presenting information about the perceived and remembered features of the external appearance of a potential perpetrator of the crime.[4]

Reproducing the appearance of a person requires recalling a memorised image and then verbally expressing it, which is an extremely difficult task due to the multitude of distinguishing features that make each person unique. Indeed, human bodies are undoubtedly mostly similar to one another to a greater or lesser extent. This also applies to the most representative part of the human body, namely the face. Almost all human faces are made up of the same elements such as a pair of eyes, eyebrows, a nose, and a mouth. Therefore, in the context of reproducing the appearance of a person, it is worth pointing out an interesting and important phenomenon, which according to E. Gruza is manifested in the fact that it is easiest for a person to remember phenomena that stand out, with a strong colouration – pleasant or unpleasant, attractive or unattractive. The stronger a specific stimulus affects a person, the more vivid and thus more lasting the memory trace is.[5]

2. History of descriptive methods

In view of the above, and in particular the last discussed issue, it should be noted that since the beginning of human history, humanity has used the relationship referred to above and learned by the science of psychology, to describe the external appearance of a human being as accurately as possible, as well as to identify him

[3] B. Hołyst, *Psychologia kryminalistyczna*, Warszawa 2018, p. 1087. An example of recognition may be a situation in which a witness or any other person is unable to describe the place where the incident took place, but when taken to the vicinity of that place, would be able to point it out precisely.

[4] For more details, see D. Rode, K. Dukała, J. Kabzińska, K. Zalewska-Łunkiewicz, *Kliniczna psychologia sądowa*, Warszawa 2020, p. 354; E. Gruza, *Psychologia sądowa dla prawników*, Warszawa 2017, pp. 68–69.

[5] E. Gruza, *Psychologia…*, p. 83.

or her. The first records of descriptive representation of human appearance come from ancient Egypt and date back to 238 BC. At that time, the ancient Egyptians practiced two descriptive systems: long and abbreviated. The long system included the offender's name (if known), height, posture, eye and hair colour, face shape, nose shape, mouth shape, description of birthmarks and other characteristic traits located on certain body parts. The abbreviated description boiled down only to the name, age and birthmarks – physical marks specific to the offender's body.[6] As can be seen from the above, psychological rules related to stimulating the processes of reproducing remembered content have been widely used since ancient times. The literature provides an example of an arrest warrant issued in the second century BC, containing a descriptive representation of the external characteristics of the perpetrator of the crime.[7]

Due to the fact that the recording of the appearance of the perpetrator of the crime in the memory of the witness, if the former has been even superficially noticed, requires establishing eye contact with that person and then encoding in one's memory the characteristic features identifying the perceived object, it is worth pointing out that in order to more efficiently and confidently remember the features identifying a person, various types of procedures were commonly used from ancient times to the 19th century to facilitating the subsequent description and, as a result, detection of the perpetrator when he or she commits the crime again. In ancient Greece and Rome, a commonly used means of distinguishing the perpetrators of crimes was their stigmatisation (branding).[8] After all, a man who stood out from the crowd evoked interest, and his stigmata warned others, causing increased caution among the public and a decrease in the victimological risk. However, with the

[6] K. Karwowska, D. Hebda, *Portret pamięciowy – zarys problematyki*, "Kortowski Przegląd Prawniczy" 2014, no. 3, p. 7.

[7] For more details, see P. Horoszowski, *Od zbrodni do kary*, Warszawa 1966, pp. 43–44. Similarly S. Mikawoz, *Metody odtwarzania wyglądu zewnętrznego sprawcy przestępstwa na podstawie zeznań świadków*, [in:] *Portret pamięciowy. Wybrane zagadnienia*, ed. J. Zajdel, Warszawa 2006, p. 7–8.

[8] It was a type of punishment classified as the so-called "skin and hair punishment" and humiliating at the same time, as it was carried out publicly at the pillory using red-hot iron tools, i.e. stamps and seals. The marks were burned on the criminal's forehead, cheeks, nose, shoulders, ears, and sides. The ancient Romans burned the letter "F" (Latin *fur* – thief) on the backs of thieves, while the ancient Greeks burned the letter "Θ" (Greek *theta*). For more details, see J. Gąsiorowski, *Kryminalistyczna identyfikacja człowieka – rys historyczny (wybrane zagadnienia)*, Katowice 2004, pp. 11–12. The practice of corporal punishment disappeared with the great socio-cultural changes that took place on the European continent in the 18th and 19th centuries. At the beginning of the 19th century, mutilation punishments were completely abolished, and human branding in the form of burning identification marks disappeared from the practice of individual countries on different dates. In England, this took place in 1779, in France in 1832, in Austria in 1848, and in Russia and the Kingdom of Poland in 1865. For more details, see J. Warylewski, *Kara. Podstawy filozoficzne i historyczne*, Gdańsk 2007, p. 221.

increasingly rapid growth of the population, the gradual loosening of social ties and social anonymisation, these inhumane distinguishing measures have become ineffective and, moreover, have been prohibited by law.

The multitude of people, repetitive features of clothing and accessories made it virtually impossible to remember a person's appearance and then to reproduce it accurately. Noticing these factors, countries in 19th-century Europe began to strive for the standardisation of terminology and the way of describing human appearance. A forefather of the modern descriptive system for individuals based on scientific foundations is considered to be Alphonse Bertillon, who in 1884 started working on the principles of formulating the so-called verbal portrait, i.e. a formalised and precise language that could be used to create a descriptive portrait of an unknown perpetrator of the crime. The detailed catalogue of descriptive features of human body structure developed by Bertillon, along with the corresponding graphic models, became the foundation for the systems used in the 21st century to create facial composite sketches based on witness accounts.

3. Composite sketching in the practice of prosecution authorities

Verbal descriptions of a person's appearance and distinguishing features have been used since ancient times, and just as in the past, this technique is still based on the use of intangible forensic evidence, namely memory traces. Memory traces are representations of observed events, created under the influence of external stimuli and collected in a person's memory, which are revealed, analysed and evaluated, i.a., during forensic-procedural activities or operational and reconnaissance activities carried out with the participation of that person.[9] In the context of this paper, it can therefore be said that memory traces are the knowledge possessed by a witness about the event under investigation, owing to which it is possible to provide prosecution authorities with information about the characteristics identifying the perpetrator of the crime. They arise as a result of the actual observation by the witness of the event, the course and circumstances of the criminal behaviour, including in

[9] For more details, see J. Vetulani, *Po śladach wspomnień*, "Charaktery" 2000, no. 1, pp. 20–22; J. Kasprzak, B. Młodziejowski, W. Kasprzak, *op. cit.*, p. 56. See also J. Wójcikiewicz, E. Szumakowicz, *Ślady pamięciowe*, "Studia Kryminologiczne, Kryminalistyczne i Penitencjarne" 1984, no. 15, p. 136 ff.; S. Pikulski, *Kilka uwag na temat śladów pamięciowych i ich wartości dowodowej*, "Problemy Kryminalistyki" 1994, no. 204, p. 26 ff.; J. Wójcikiewicz, V. Kwiatkowska-Wójcikiewicz, *Paradygmaty kryminalistyki*, [in:] *Paradygmaty kryminalistyki*, ed. J. Wójcikiewicz, Kraków 2016, p. 19. Example of procedural activities involving memory traces include in particular questioning, certain expert opinions or a forensic experiment/reconstruction of the scene of crime. It is worth noting, however, that memory traces can sometimes also appear without being caused by external stimuli, e.g. as a result of hallucination. See T. Hanausek, *Kryminalistyka. Zarys wykładu*, Warszawa 2009, p. 76.

particular the observation and memorisation of the external characteristics of the perceived potential perpetrator of the crime.

J. Kabzińska argues that a disclosed and recorded memory trace saved in memory of an actual witness of the event concerning offender's appearance may be referred to as a memory portrait (composite sketch).[10] Composite sketching was presented by other authors in a different way, but not contradictory to the above synthetic reasoning. For example, it can be pointed out that T. Kozieł and Z. Dębiński understood the concept of composite sketching as a professional description and graphic system, giving the possibility of establishing the appearance of a person on the basis of third-party relations.[11] In contrast, the exclusively graphic form of description of the appearance of person remembered as a definition of composite sketch is pointed out by S. Mikawoz, who excludes from the scope of the defined concept the verbal description of human appearance, understanding composite sketch as a "description in the graphic form of the appearance of the person remembered, taking into account the features of a static (constant, unchanging) and dynamic (changing) character".[12]

In my opinion, this definition is too restrictive, because by excluding from attributing to the composite sketch a descriptive reconstruction of the appearance of an unknown perpetrator of the crime, the dictionary meaning of the term "composite sketch" (Polish: *portret pamięciowy*; literally: memory portrait) is invalidated. While the Polish language dictionary refers to the term "portrait" in the first definition as "a work of visual art, representing a specific person or group of people with similarity", under the same entry also indicates such understanding: "characteristics, description of a figure".[13] For this reason, I agree with the position presented in the literature, that the composite sketch is a component of two forms: descriptive – a verbal description of the look of a person, and illustrative – the composite picture. For this reason, it is worth pointing out that the description should be considered a verbal characteristic of human appearance, containing a specification of the features and proportions of the anatomical structure of the body, specifically: the type of figure, shape of the head, shape of the face and its individual elements, way of movement and information on distinguishing marks (scars, birthmarks, tattoos).[14] A facial composite drawing is a separate method of recreating the appearance of a person, based on a verbal description, which may

[10] J. Kabzińska, *Portret pamięciowy w postępowaniu przygotowawczym i sądowym*, "Kwartalnik Krajowej Szkoły Sądownictwa i Prokuratury" 2014, no. 1, p. 58.

[11] T. Kozieł, Z. Dębiński, *Portret obrazowy w identyfikacji i poszukiwaniu osób (stan i perspektywy)*, "Problemy Kryminalistyki" 1992, no. 197–198, p. 11.

[12] S. Mikawoz, *op. cit.*, p. 10.

[13] *Portret*, https://sjp.pwn.pl/slowniki/portret.html (access: 16.10.2025).

[14] S. Zubański, *Odtwarzanie wyglądu osób*, [in:] *Wybrane zagadnienia techniki*, eds. W. Kędzierski, G. Kędzierska, Szczytno 2011, pp. 160–161.

take the form of, e.g., a handwritten drawing, an identikit, a photograph or a computer image.[15] The above understanding may lead to the statement that a complete composite sketch may be called a graphic reproduction of the face of an unknown perpetrator enriched with a detailed description of it.

FORENSIC-PROCEDURAL NATURE OF COMPOSITE SKETCHING

No provision of the Polish Criminal Procedure Code[16] defines, nor does it explicitly refer to the independent nature and procedure of making a composite sketch. This normative gap is puzzling and may stir the discussion on how to fill it, especially as both the description and the composite sketch are an integral part of the arrest warrant, the components of which are listed in Article 280 § 1 CPC. Pursuant to point 2 § 1 of Article 280 CPC, the arrest warrant shall provide data about a person which may facilitate the search for this person, and above all, personal details, description, distinguishing marks, place of residence and work, including, if possible, a photograph of the wanted person. Scholars of criminal procedural law indicate in this respect that where it is not possible to attach a photograph to the arrest warrant, a composite sketch may be attached instead.[17]

Therefore, due to the fact that the concept of composite sketch has not been defined by the legislature in any way, there are many concepts and views of its legal nature in forensic literature. For example, it can be pointed out that J. Moszczyński considers the preparation of a composite sketch as an activity of interviewing an interviewee with the participation of a specialist.[18] J. Widacki and B. Młodziejowski, on the other hand, point out that an attempt to recreate the appearance of the person being described should be treated as a forensic experiment/reconstruction of the crime scene within the meaning of Article 211 CPC.[19] There are also authors who

[15] J. Gąsiorowski, *Portret pamięciowy w praktyce organów ścigania*, [in:] *Wybrane zagadnienia służby policyjnej*, ed. A. Rosół, J. Słobosz, K. Silska, part 2, Katowice 2012, p. 10; J. Kabzińska, *Portret pamięciowy sprawcy w świetle badań psychologicznych*, [in:] *Psychologia sądowa*, ed. M. Szpitalak, K. Kasparek, Kraków 2014, p. 294.

[16] Act of 6 June 1997 – Criminal Procedure Code (consolidated text, Journal of Laws 2025, item 46), hereinafter: CPC.

[17] M. Lipczyńska, *Polski proces karny. Zagadnienia ogólne*, vol. 1, Warszawa 1986, p. 150.

[18] J. Moszczyński, *Antropometryczne metody identyfikacji człowieka*, [in:] *Kryminalistyka, czyli o współczesnych metodach dowodzenia przestępstw*, eds. E. Gruza, M. Goc, J. Moszczyński, Warszawa 2020, p. 314.

[19] J. Widacki, B. Młodziejowski, *Kryminalistyczne zastosowanie antropologii*, [in:] *Kryminalistyka*, ed. J. Widacki, Warszawa 2016, p. 241. In my opinion, this classification cannot be considered right. Forensic experiment/reconstruction of the crime scene regulated by Article 211 CPC is an act that can at most verify whether a composite sketch can be made with the participation of a specific witness at all. The provision of Article 211 CPC allows for an experiment or reconstruction of the course of

consider the process of reconstructing the appearance of an unknown perpetrator of the crime as a form of identification parade.[20]

In my opinion, the above classifications are not worth acceptance, as they ignore the specific nature of the mode of revealing the memory trace preserved in the memory of an actual witness to an event and its subsequent conversion into a visual form. Therefore, in this context, it is worth noting the position of J. Wójcikiewicz and E. Szumakowicz, who rightly pointed out that a composite sketch of the perpetrator's appearance is a material copy of the witness's memory trace.[21] Assuming the fact that memory traces are revealed in the course of the procedural activity of questioning,[22] it should be considered reasonable that the creation of a composite sketch should be carried out in the form of a procedural activity classified as a witness examination, with the subsequent participation of an expert

events or their fragments in order to verify circumstances that are of crucial importance for the case. Forensic experiment/reconstruction of the crime scene consists in determining the actual possibility of occurrence of certain facts or phenomena. From the perspective of the issues discussed here, it can be assumed that the experiment could be used to examine whether it is possible for a witness in certain conditions to notice offender's traits, important for describing the external appearance of the perpetrator. The purpose of the reconstruction is to check whether the event could have a specific course. Therefore, the case law approves the practice of conducting a forensic experiment/reconstruction of the crime scene to demonstrate the witness's possibility to notice the perpetrator's face or body during the incident, which affects the subsequent possibility of their proper presentation during the preparation of a composite sketch. For example, see judgment of the Court of Appeal in Lublin of 17 December 2007, II AKa 273/07, LEX no. 357229. Apart from the provision of Article 211 CPC, another provision of crucial importance in terms of conducting a forensic experiment/reconstruction of the crime scene is § 62 (1) of the Guidelines No. 3 of the Chief Commander of the Police of 30 August 2017 regarding the performance of certain investigative activities by police officers (Journal of Laws of the National Police Headquarters 2017, item 59).

[20] E. Gruza, *Okazanie. Problematyka kryminalistyczna*, Toruń 1995, pp. 129–134. The provision of Article 173 § 1 CPC indicates that the person being questioned may be presented with another person, their image, or thing for the purpose of their recognition. This is an activity constituting a special type of questioning, which is based on the already mentioned ability of human memory to recognise people, things, and images. Recognition is based on comparing the stimuli currently affecting the recogniser with the stimuli that previously acted on him or her and were remembered by him or her. Their primary purpose is to recognise, and thus to state that the object being shown is identical and not just similar. In the case of preparing a composite sketch, there will never be a situation where, as a result of the statements of a witness to the incident, the profile of the perpetrator of the crime presented by the witness is a hundred percent reliable reflection of perpetrator's external appearance. Therefore, it cannot be considered that drawing a composite sketch is equivalent to a criminal procedural act of identification parade. For more details on identification parade as a specific type of interview, see A. Taracha, *Niepowtarzalność okazania. Teoria i praktyka*, "Problemy Praworządności" 1991, no. 1–2, pp. 67–72; Z. Czeczot, *Kryminalistyczna problematyka osobowych środków dowodowych*, Warszawa 1976, p. 107; R. Kmiecik, *Rekognicja i konfrontacja w świetle założeń dowodu ścisłego*, "Nowe Prawo" 1981, no. 5, p. 26.

[21] J. Wójcikiewicz, E. Szumakowicz, *op. cit.*, p. 129 ff.

[22] In more detail, see R. Kmiecik, *Prawo dowodowe*, Kraków 2005, pp. 25, 167–205.

appointed to visualise the figure of the unknown perpetrator by way of a decision issued by the procedural authority conducting the proceeding.[23] The procedural authority decides not only on the necessity of appointing an expert witness, but also on the choice of their specialisation, except in cases where the provisions of the Criminal Procedure Code explicitly indicate the specialisation of the expert witness who should be appointed to resolve a specific issue (see Article 202 § 1 CPC). Therefore, it should be considered that in order to present in a graphic form a description of the perpetrator, the appropriate specialisation of the expert witness will be anthroposcopy or drawing.[24] The witness's testimony and statements, recorded in accordance with Article 143 § 1 (2) CPC, constitute subsequently the research material for an expert in the relevant field.[25] Therefore, achieving the desired effect, i.e. developing a visualisation of human appearance based on the oral account given by a witness, requires a professional approach and thorough preparation on the part of both the expert and, in particular, the interviewer in terms of tactics of questioning.

[23] S. Mikawoz, *op. cit.*, p. 13; J. Gąsiorowski, *Portret pamięciowy…*, pp. 20–28; J. Kasprzak, B. Młodziejowski, W. Kasprzak, *op. cit.*, p. 109; M. Kulicki, V. Kwiatkowska-Wójcikiewicz, L. Stępka, *Kryminalistyka. Wybrane zagadnienia teorii i praktyki śledczo-sądowej*, Toruń 2009, pp. 259–262; I. Pajdała, *Tożsamość z portretu*, "Policja" 2020, no. 12, pp. 12–13. See also judgment of the Court of Appeal in Szczecin of 4 July 2019 (II AKa 107/19, LEX no. 2758418) in a case of involuntary manslaughter, in which the Court explicitly decided that a composite sketch made by an expert artist should have been an annex attached to the witness's statement on the basis of which it had been made.

[24] It seems obvious that decoding the information content from the witness's memory traces revealed during the questioning, concerning the verbal description of the human appearance and translating these into a graphic form, should be included in the so-called special knowledge referred to in Article 193 § 1 CPC. After all, both case law and scholars in the field note unanimously that the scope of the concept of "special knowledge" refers to the knowledge of an individual (an expert) in the fields of art, technology, crafts, or science, which goes beyond the normal knowledge common in the given conditions of social development. This knowledge also extends to practical skills that go beyond this line. See judgment of the Court of Appeal in Wrocław of 28 January 2014, II AKa 430/13; decision of the Supreme Court of 10 February 2021, IV KK 574/20. On rhabdomancy as a kind of special knowledge in the light of the provisions of the Civil Procedure Code, see resolution of the Supreme Court of 30 October 1985, III CZP 59/85, OSNC 1986, no. 9, item 140. Cf. T. Tomaszewski, *Dowód z opinii biegłego w procesie karnym*, Kraków 2000, pp. 9–10; J. Wójcikiewicz, *Dowód naukowy w procesie sądowym*, Kraków 2000, pp. 69–75; T. Widła, *Opinia biegłego*, [in:] *System Prawa Karnego Procesowego*, vol. 8, part 4: *Dowody*, ed. J. Skorupka, Warszawa 2016, p. 4944; R. Kmiecik, *op. cit.*, pp. 181–184. For the rightness of indicating the expert's specialisation as a drawing artist, see judgment of the Court of Appeal in Szczecin of 4 July 2019, II AKa 107/19, LEX no. 2758418.

[25] S. Marzec, *Obrazowy portret pamięciowy jako dowód w procesie*, "Problemy Kryminalistyki" 1996, no. 211, pp. 22–23.

TECHNICAL ASPECTS OF CONSTRUCTING A COMPOSITE SKETCH – BUILDING A FACIAL IMAGE

1. Introductory issues

Descriptions prepared on the basis of the content of testimonies of witnesses of the event are commonly used in the everyday practice of law enforcement agencies,[26] but even the most precisely formulated verbal message is not able to replace and speak to the imagination of the recipient (law enforcement agency or the general public) as clearly as a picture. That is why forensic science has developed over the years a number of methods that make it possible to transform a drawing into a visual form.[27] These include, in particular, drawing, identikit, mixed and computer methods. Guided by the description of the external characteristics of the wanted perpetrator provided by the witness being interviewed, the expert using one of the above methods (where currently it will most often be the drawing or computer method) gives the verbal description a graphic form.[28]

One cannot agree with the view proposed by Kabzińska that the visualisation of the description of the perpetrator of the crime, made by conducting the interrogation of a witness regarding this circumstance, is the activity of a specialist within the meaning of Article 205 CPC.[29] In Article 205 § 1 CPC the legislature has regulated, in the form of a closed catalogue, the scope of procedural actions in which the participation of a specialist is admissible. It includes solely: visual inspection, questioning performed with the use of technical equipment enabling this activity to be carried out remotely, experiment, expert opinion, seizure of things or search. The participation of a specialist in the above activities is admissible, provided that their performance requires conducting technical activities, the catalogue of which has been determined by the legislature as open-ended, as evidenced by the use of the phrase "including in particular". Therefore, it is not possible to recognise

[26] Studies conducted in the United Kingdom confirm this thesis. Out of the 78 Kent police officers surveyed, 59.7% stated that descriptions of perpetrators presented by witnesses are key information for the proceedings and accurately reflect the appearance of the perpetrator. At the same time, the vast majority (80.6%) of officers have expressed the opinion that the number of details concerning the external characteristics of the perpetrator could be greater. In more detail, see C. Brown, T.J. Lloyd-Jones, M. Robinson, *Eliciting Person Description from Eyewitnesses: A Survey of Police Perceptions of Eyewitness Performance and Reported Use of Interview Techniques*, "European Journal of Cognitive Psychology" 2008, vol. 20(3), pp. 535–537.

[27] M. Michalski, *Sporządzanie portretu pamięciowego z wykorzystaniem transferu danych za pomocą Internetu*, "Problemy Kryminalistyki" 2013, no. 279, p. 36.

[28] Identikit methods are currently considered as having purely historical significance; they are not used in practice. See J. Kasprzak, B. Młodziejowski, W. Kasprzak, *op. cit.*, p. 109.

[29] J. Kabzińska, *Portret pamięciowy w postępowaniu…*, p. 46 ff. For more on the "Pętlarz" case, see A. Żądło, *Bal maskowy z „Pętlarzem"*, "Magazyn Detektyw" 2016, no. 1, pp. 34–35.

the act of making an image according to the existing description as an activity of a specialist, because a specialist cannot participate in activities other than those indicated by the legislature.[30]

Taking into account the gravity of some crimes, including in particular homicide, any information that may lead to a narrowing of the circle of suspected persons to those presenting certain characteristics, including, but not limited to, features of external appearance, is extremely important for law enforcement authorities. For this reason, research is being conducted to use as little output data as possible from a witness and process it into a facial image by artificial intelligence.

2. Use of artificial intelligence in constructing a facial image

2.1. Concept of artificial intelligence

Artificial intelligence (AI) is a term that was first introduced into common use by J. McCarthy in 1956. According to him, it was the theoretical and practical ability to design intelligent machines whose operation could be similar to human manifestations of intelligence.[31] Currently, AI is becoming the subject of discussion about its impact on the socio-economic functioning of society, but also on the possibility of using it in the activities of law enforcement agencies. Despite the widespread interest in it, there is no single and commonly used definition, including in particular legal definition.[32]

On an auxiliary basis, we can also point here to the definition proposed by K. Różanowski, who notes that it is the section of computer science that deals with the designing of machines and algorithms, the operation of which has the attrib-

[30] M. Kurowski, [in:] *Kodeks postępowania karnego*, vol. 1: *Komentarz aktualizowany*, ed. D. Świecki, LEX/el. 2023, commentary on Articles 205 and 206. For more details, see A. Taracha, *Instytucja specjalisty w polskim procesie karnym. Zagadnienia prawnodowodowe*, [in:] *Aktualne tendencje w badaniach dokumentów. Materiały XIII Wrocławskiego Sympozjum Badań Pisma*, ed. Z. Kegel, Wrocław 2010, p. 506.

[31] A. Augustynek, *Wprowadzenie do psychologii*, Warszawa 2018, pp. 120–121. For more details, see J. McCarthy, M.L. Minsky, N. Rochester, C.E. Shannon, *A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence, August 31, 1955*, "AI Magazine" 2006, vol. 27(4), pp. 1–9.

[32] Paragraph 6 of the Regulation referred to above points to, among other things, the need to formulate a precise definition of the term "artificial intelligence". According to its current wording: "The notion of AI system should be clearly defined to ensure legal certainty, while providing the flexibility to accommodate future technological developments". According to a document issued by the European Union, artificial intelligence should be understood as a set of systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals. For more details, see High-Level Expert Group on Artificial Intelligence, *A Definition of AI: Main Capabilities and Scientific Disciplines*, Brussels, 8.4.2019, https://digital-strategy.ec.europa.eu/en/library/definition-artificial-intelligence-main-capabilities-and-scientific-disciplines (access: 16.10.2025), p. 1 ff.

utes of intelligence, understood as the ability to automatically adapt to changing conditions, make complex decisions, learn and perform abstract reasoning.[33] There is also the definition by T. Zalewski, who claims that AI should be understood as a system that allows for the performance of tasks that require the process of learning and considering new circumstances when solving a given problem and which may, to varying degrees depending on the configuration, operate autonomously and interact with the environment.[34]

Artificial intelligence systems operate (in the vast majority) based on artificial neural networks. These are semiconductor structures that simulate the functioning of human brain neural networks and the connections between them. These artificial neurons mimic some of the functions of real neurons in the brain. As a result, they adopt certain features of the brain.[35] Artificial neural networks can recognise and classify objects or images by entering and "absorbing" an adequate amount of data grouped into rows and columns, allowing these networks to learn to predict or recognise new data inputs.

I. Goodfellow and his team have been working to enhance the creative capacity of artificial intelligence to allow developing artificial intelligence software capable of creating new objects – images and literary or musical works.[36] The theory of so-called generative adversarial neural networks, developed and implemented for practical use, assumes the existence of two neural networks: a generator to create new data and a discriminator which controls and evaluates the content produced by the generator on a zero-one scale. The "zero" assessment of an element thus generated results in the return of the created content to the generator and its renewed creation. This process is repeated multiple times, at a very fast pace, until the discriminator considers the result of the content created by the generator to be correct, and thus assessed as "one".[37]

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[33] K. Różanowski, *Sztuczna inteligencja. Rozwój, szanse i zagrożenia*, "Zeszyty Naukowe Warszawskiej Wyższej Szkoły Informatyki" 2007, no. 2, p. 111.

[34] T. Zalewski, *Definicja sztucznej inteligencji*, [in:] *Prawo sztucznej inteligencji*, eds. L. Lai, M. Świerczyński, Legalis 2020. Autonomy of the AI system concerns its independence of a human factor. At their highest level of autonomy, AI systems are found, among others, in state-of-the-art motor vehicles, where they are responsible, i.a., for the function of the vehicle's full autopilot – where AI manages all processes related to the movement of the vehicle, including performing maneuvers such as overtaking or changing lanes. See *ibidem*.

[35] R. Tadeusiewicz, *Archipelag sztucznej inteligencji. Część I*, "Napędy i Sterowanie" 2020, no. 12, pp. 31–32.

[36] For more details, see I. Goodfellow, J. Pouget-Abadie, M. Mirza, B. Xu, D. Warde-Farley, S. Ozair, A. Courville, Y. Bengio, *Generative Adversarial Nets*, "Communications of the ACM" 2020, vol. 63(11), pp. 1–8.

[37] *Ibidem*, p. 1; F.A. Galatolo, M.G.C.A. Cimino, G. Vaglini, *Generating Images from Caption and Vice Versa via CLIP-Guided Generative Latent Space Search*, [in:] *Proceedings of the International Conference on Image Processing and Vision Engineering*, SciTePress 2021, p. 1;

2.2. Making a facial image based on a description with the use of AI

Artificial intelligence can be used to create an image of a person based on a description provided by a witness to the incident. Since 2020, a few widely available tools based on a generative adversarial neural network have been in operation, which can be used to create a visualisation based on a verbal description. One of them is CLIP (Contrastive Language–Image Pre-training), a universal tool which, as AI software, has been trained to recognise and associate specific images with their corresponding names and characteristics. The database for this tool is the publicly available Internet.

It is also worth mentioning the software developed by NVIDIA – StyleGAN2.[38] It is dedicated to creating images of human faces based on their verbal descriptions, even laconic ones. This software has managed to generate realistic-looking human likenesses based on descriptions limited only to characteristics such as a man's face with brown eyes and facial hair or a blonde woman's face with blue eyes and glasses.[39] The facial images generated were not verified in terms of the correspondence of the generated image with the actual appearance of the person described, but the very possibility of creating a facial image by artificial intelligence was tested.

Another tool that currently is in the testing phase and not yet available for general use or the use for law enforcement is Forensic Sketch AI-rtist, based on a deep learning AI system called DALL-E 2, developed by OpenAI.[40] This tool aims to enable the creation of a facial image using AI based on a descriptive representation of external appearance characteristics. Within seconds upon the upload to the server, these characteristics are processed into a sketch that can be immediately accepted by an expert witness. Moreover, once the image has been generated, the expert can also download it and make corrections, if necessary.[41] The fact that this tool can concurrently generate up to four images makes it possible to see multiple variants of the described person's appearance and select the one that most closely matches the witness's description.

H. Mazur, *GAN, czyli jak nauczyć komputer kreatywnego myślenia*, 1.7.2020, https://oiot.pl/gan-czyli-jak-nauczyc-komputer-kreatywnego-myslenia (access: 12.9.2025).

[38] E. Friedman, G. Elbaz, *Generating Facial Diffuse Maps with StyleGAN2*, 2021, https://www.nvidia.com/en-us/on-demand/session/gtcspring21-p31439/?playlistId=playList-732084e5-69a8-4f13-8a66-ef831394a957 (access: 12.9.2025).

[39] F.A. Galatolo, M.G.C.A. Cimino, G. Vaglini, *op. cit.*, p. 9.

[40] DALL-E 2, https://openai.com/dall-e-2 (access: 10.7.2025); Inteligencja Sztuczna, *Czym jest DALL-E 2 i jak działa?*, https://inteligencjasztuczna.pl/czym-jest-dall-e-2-i-jak-dziala (access: 10.7.2025).

[41] M. Taylor, *AI Software Can Create Suspect Sketches*, 8.2.2023, https://www.forensicmag.com/594323-AI-Software-Can-Create-Suspect-Sketches/ (access: 10.8.2025).

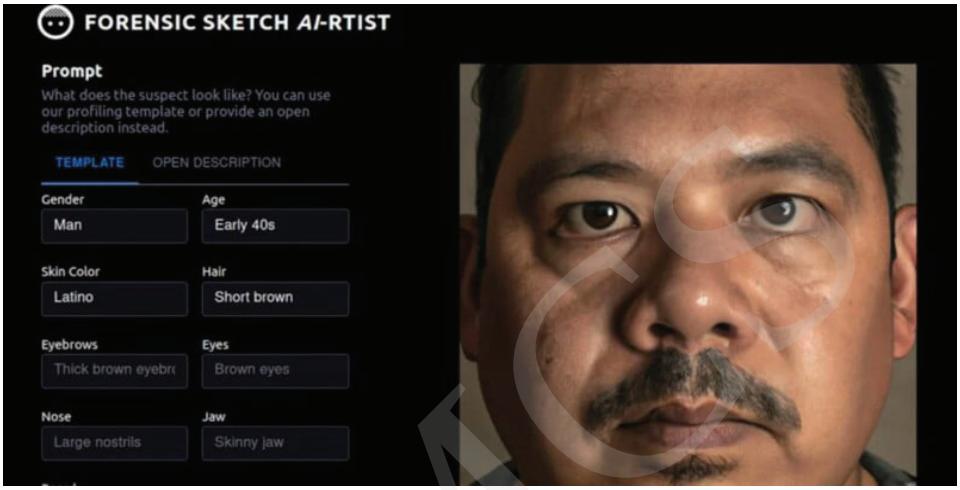

Figure 1. A facial image generated on the basis of a verbal description containing four physical characteristics

Source: M. Growcoot, *Controversial AI Program Generates Photorealistic Police Sketches*, https://petapixel.com/2023/02/13/controversial-ai-program-generates-photorealistic-police-sketches (access: 19.2.2025).

Considering the early stage of development of the technology described above, but also taking into account the results that can be achieved with its use, it seems that its future looks promising and offers the possibility of practical application in law enforcement work. It is worth emphasising that the tactical and forensic correctness of witness questioning, including in particular the ability to formulate precise questions and obtain information relevant to the creation of a facial image, is crucial. This postulate is of paramount importance in homicide cases. The scarcity of information that a witness may communicate should not preclude the possibility of at least a preliminary visualisation of the perpetrator's appearance. As practical experience shows,[42] when describing a person's appearance, witnesses most often provide information about the perpetrator's sex, approximate age and height, hairstyle or facial hair, but also elements of clothing, including accessories – thus, the information provided is scarce, but it can still be used by AI.

2.3. Making the visualisation of human appearance based on a hand-drawn sketch with the use of AI

One of the key factors determining the degree of detail and, above all, the usefulness of a composite sketch made using hand-drawing methods is that it should be prepared as quickly as possible after the event. Only then is the witness able to

[42] J. Gąsiorowski, *Portret pamięciowy…*, p. 12.

provide the maximum number of remarks regarding the appearance of the perpetrator they observed. Therefore, the optimal situation would be to create composite sketches as early as during the first questioning of the witness. However, it should be noted that this technique requires artistic skills, not necessarily at the level of fine arts, but skills that fall within the term "special skills" in the meaning of Article 193 CPC.[43] The limited number of experts in anthroposcopy who create composite sketches using this technique is an objective obstacle to meeting this postulate.

So it seems that the latest reports of a technique that allows the use of AI systems to create accurate facial images based on hand-drawn sketches can be considered interesting. The published results of research on the AI software called DeepFaceDrawing indicate that it is possible to create a photorealistic image of an unknown person based on a standard hand-drawn sketch, including the contours of a person's face alone.[44] This system is composed of three main modules responsible for the learning of the features that determine the appearance of the human face (Component Embedding Module), the arrangement of individual elements of the face structure (Feature Mapping Module), and generating realistic face images (Image Synthesis Module).[45] Thanks to this, the system updates and refines the images it creates on an ongoing basis. The authors of the software conducted experimental tests on a group of ten participants, who made hand-drawn sketches of faces without adding any additional information in a descriptive form. On their basis, the system alone generated photorealistic images of people.

It should be noted that the DeepFaceDrawing system is currently at an early stage of development, and the images presented in the article by Y. Chen, W. Su, L. Gao, S. Xia and H. Fu have not been assessed for their compliance with the likeness of the actual person depicted. However, according to the claims of the software authors, it will be possible to generate visualisations of other objects in the future, including entire human body figures.[46]

Another tool based on AI that can be helpful in visualizing human appearance is the already widely used ChatGPT.[47] Thanks to advanced image processing

[43] Idem, *Nowoczesne technologie w kryminalistyce*, "Kultura Bezpieczeństwa. Nauka–Praktyka–Refleksje" 2016, no. 21, p. 95.

[44] S.Y. Chen, W. Su, L. Gao, S. Xia, H. Fu, *DeepFaceDrawing: Deep Generation of Face Images from Sketches*, "ACM Transactions on Graphics" 2020, vol. 39(4), p. 2.

[45] *Ibidem*, pp. 5–6.

[46] *Ibidem*, p. 13; M. Luśtyk, *Sztuczna inteligencja zamienia proste szkice w fotorealistyczne portrety. Witamy w czasach końca fotografii*, 18.6.2020, https://www.fotopolis.pl/newsy-sprzetowe/branza/33669-sztuczna-inteligencja-zamienia-proste-szkice-w-fotorealistyczne-portrety-witamy-w-czasach-konca-fotografii (access: 16.10.2025).

[47] ChatGPT is an AI system developed by the American company OpenAI, the first version of which was made available for general use in November 2022. It is based on the analysis of the query formulated by the user and generating a response based on preprocessed data. Its many fields of use include one the ability of the ChatGPT to analyse images and generate visualizations, making it

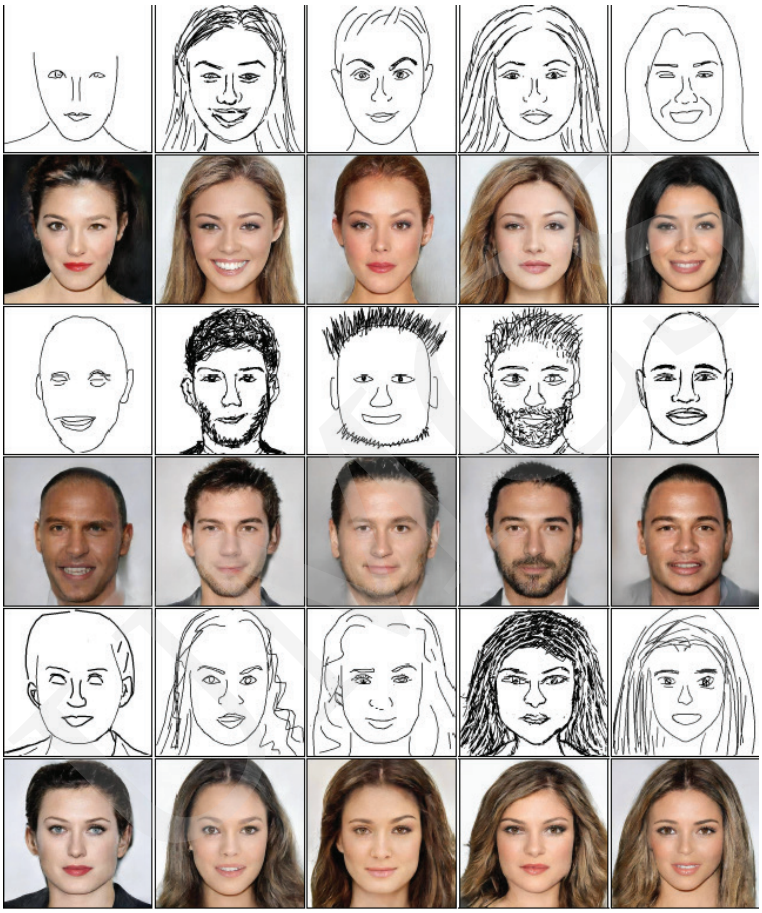

Figure 2. Images of persons generated by the AI based on hand-drawn sketches

Source: Y. Chen, W. Su, L. Gao, S. Xia, H. Fu, *DeepFaceDrawing: Deep Generation of Face Images from Sketches*, "ACM Transactions on Graphics" 2020, vol. 39(4), p. 2.

algorithms, this model can transform very schematic, even simplified drawings (sketches) into photorealistic images of people. This technology appears to offer new perspectives for detective actions, particularly at an early stage when available information on the appearance of a potential offender is fragmented or scarce. ChatGPT, thanks to its learning ability, can supplement missing data based on general phenotypic assumptions valid for a specific population. In this

a versatile tool used in entertainment, education and everyday life. Photorealistic images can currently be generated by ChatGPT using the AI model DALL-E 3, available under the ChatGPT interface (GPT-4o). See E. Gregersen, *Chat Generative Pre-Trained Transformer*, https://www.britannica.com/technology/ChatGPT (access: 27.5.2025).

Figure 3. Image of a human being generated by ChatGPT based on a hand-drawn sketch and description

Source: author's own creation using the ChatGPT interface (GPT-4o): https://chatgpt.com (access: 28.5.2025).

context, one can indicate the probable bio-geographical origin, approximate age, and sex of a person. Therefore, it is possible to generate images of people based on residual descriptive data or hand-drawn sketches that can be made by a police officer or the witness.

Figure 3 is an example of the use of the ChatGPT interface in the discussed area. Having drawn a schematic image of a human being, scanned it and entered it into a command line, one assigns ChatGPT a task to "generate from the sketch a photorealistic likeness of a human being, taking into account its probable European bio-geographical origin and the probable age of about 25–35 years" (a so-called prompt).

While looking optimistically into the future of the use of AI in the activities of law enforcement agencies, one should bear in mind, however, the still valid position presented by J. Sehn, who pointed out that "the limit of the use of all scientific discoveries and various new technological methods within the framework and forms of forensics is the practically and genuinely scientifically proven state of the art for a given branch of knowledge and the usefulness of its scientific achievements based on scientific thinking".[48] Consequently, it should be borne in mind that it is

[48] J. Sehn, *Obecny stan kryminalistyki w Polsce*, [in:] *Stan kryminalistyki i medycyny sądowej*, Warszawa 1951, p. 14, cited after J. Wójcikiewicz, *op. cit.*, p. 7. The idea of this author is

currently not possible to predict the final shape of any tools based on the use of AI algorithms. The reason for this is that AI is currently developing at the pace described by A. Dragan as a doubly exponential rate, which results in the inability to definitively predict the direction of its development.[49]

CONCLUSIONS

Despite having been of interest to law enforcement agencies and having been used in the broadly understood process of administering justice for many centuries, the composite sketch is still a systematically developed tool. The dynamic development of exact sciences, including computer science, gives the opportunity to look optimistically into the future of this technique. After all, any information that allows to narrow the circle of "potential suspects" may turn out, after proper verification, to be crucial for cases where law enforcement authorities struggle with deficits of information about the incident that occurred. In the latter context, the importance of this technique for the prosecution of homicide committed by unknown perpetrators should be particularly underlined.

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right in that it fully reflects the current issues surrounding the use of new technologies both in law enforcement and the justice system, as well as in everyday life. A. Taracha, in his article on the use of algorithms in criminal proceedings, argues that despite the widespread and long-standing use of algorithms (understood by this author as a process or set of rules used in calculations or other problem-solving procedures, especially by computers) there are numerous examples of their malfunctioning. The author points to examples of incorrect reading of vehicle registration plates, incorrect operation of the face recognition algorithm on an iPhone, and, as a consequence, unlocking of a mobile device to an unauthorised person, or incorrect identification of a suspect's face by an expert using face recognition software. For more details, see A. Taracha, *The Use of Algorithms in Criminal Procedure (Selected Issues)*, "Studia Iuridica Lublinensia" 2020, vol. 29(5), pp. 305–307.

[49] See A. Dragan, *Nie mamy pojęcia, na jakich zasadach działa Sztuczna inteligencja [Podcast]*, 14.7.2023, https://open.spotify.com/episode/52da4iTg4c8OX9iQDrmgak?si=33132a1f94ec434b (access: 16.10.2025).

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ABSTRAKT

W artykule podjęto próbę przedstawienia najnowocześniejszych zdobyczy techniki w kontekście możliwości ich wykorzystania we wspieraniu działań wykrywczych prowadzonych przez organy ścigania. Dynamiczny rozwój nauk ścisłych, w tym informatyki, jest jedną z determinant tempa i kierunku rozwoju kryminalistyki. Ma on m.in. bezpośredni wpływ na zasady sporządzania znanego od czasów starożytnych portretu pamięciowego nieznanego sprawcy przestępstwa. Autor poprzez przegląd najnowszej literatury dąży do zaprezentowania możliwości wykorzystania sztucznej inteligencji (AI) w procesie kreowania wizualnego przedstawienia sylwetki, a w szczególności wyglądu twarzy nieznanego sprawcy przestępstwa. Ponadto celem artykułu jest próba precyzyjnego ustalenia charakteru prawnego czynności sporządzania portretu pamięciowego.

Słowa kluczowe: sztuczna inteligencja; AI; zabójstwo; portret pamięciowy; kryminalistyka

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