FORECASTING CRIME:

NEW TOOLS, NEW RISKS, NEW ETHICS

Edited by
Szabolcs Mátyás

FORECASTING CRIME:
NEW TOOLS, NEW RISKS, NEW ETHICS

A Practical Introduction to Predictive Policing and Crime Prevention

Edited by
SZABOLCS MÁTYÁS

Forecasting crime: new tools, new risks, new ethics / dr. Szabolcs Mátyás - Oradea : Editura Universităţii din Oradea, 2025
Conţine bibliografie
ISBN 978-606-10-2445-2

'Who controls the past controls the future.
Who controls the present controls the past'
(George Orwell: *1984*)

FORECASTING CRIME:
NEW TOOLS, NEW RISKS, NEW ETHICS

A Practical Introduction to Predictive Policing and Crime Prevention

Edited by
Szabolcs Mátyás

Dear Readers,

The research presented in this paper focuses on various aspects of the application of artificial intelligence in predictive policing.

Since profiling is already used to identify perpetrators of crimes, the examples included in the paper, although mostly drawn from the Hungarian experience, demonstrate its usefulness in prevention, as well as the technical, forensic, legal, and ethical implications.

The considerations presented in various areas inspire the use of AI that conciliates crime prevention, fundamental rights and the rule of law.

Using AI to obtain a more precise profile in time and space, while maintaining the final interpretation by a human being, enables a better identification of risks and potential perpetrators, and consequently, protects both the security and freedom of citizens.

Yves Vandermeer
founder of the European Cybercrime
Training and Education Group

ORADEA 2025

The cover was created with the support of AI-assisted tools; the final editing was by Tamás Tímár.

Authors:

BÁCS, ZOLTÁN Ph.D. (assistant professor), BÜCKŐ ANITA (data-driven and predictive security analyst), CZENCZER, ORSOLYA Ph.D. (associate professor), CSABA, ZÁGON Ph.D. (head of department), FANTOLY, ZSANETT Ph.D. (full professor), GICZI, ISTVÁN (senior service development manager), KRASNOVA ALEXANDROVA KRISTINA Ph.D. (associate professor) MAJOR, RÓBERT Ph.D. (associate professor), MÁTYÁS, SZABOLCS Ph.D. (associate professor), NYITRAI, ENDRE Ph.D. (associate professor), PACKOSZ, NIKIFOROSZ (Ph.D. student), SIVADÓ, MÁTÉ Ph.D. (associate professor), SZABÓ, IMRE Ph.D. (prosecutor), TIHANYI, MIKLÓS Ph.D. (associate professor), TÓTH, LEVENTE Ph.D. (assistant professor), TRAUB, ZITA (university student), VAJDA, ENDRE (Ph.D. student), VÁRI, VINCE Ph.D. (associate professor)

Peer-reviewed by:

Dragana Čvorović Ph.D. associate professor

Proofreader:

Michael James Webb

Published by:

University of Oradea

e-mail: mszabolcs1975@gmail.com

Chapter 2
Major Milestones in the History of Predictive Policing[2]

Szabolcs Mátyás and Csaba Zágon

The desire to know the future is not new; people have wanted to know what the future holds for thousands of years. In ancient Greece, numerous oracles existed that people could consult for a fee to learn about their future. The most famous Greek oracle was located at DELPHI, near the Gulf of Corinth, the ruins of which can still be seen today (Figure 1). The development of risk management science has been a fundamental prerequisite for the emergence of predictive policing. The concept of risk itself originated in Athens more than 2,400 years ago. Ancient thinkers concluded that it was important to review and evaluate the possible consequences of a decision and the likelihood of their occurrence in the future. These two factors together constitute the risk associated with an event and help in avoiding poor choices while minimising potential damage (Bernstein, 1996; Aven, 2016).

Law enforcement agencies manage the social risks of crime by looking ahead in time. They strive to understand what crime may look like in the future and make informed decisions about how to address it – whether by reducing or eliminating it – through the effective use of their resources, methods, and established procedures. A crucial component of this approach is predicting future crime trends. Although this prediction involves some uncertainty, it provides a valuable starting point for law enforcement strategies. Today's predictive policing goes beyond the observations of the ancient Greeks, incorporating not only

[2] The chapter is based on Chapter 2 of the book *Közrendészet* by Péter Ruzsonyi (ed.) (2020) – written by the author.

qualitative indicators, but also quantitative data supported by mathematics, such as probability theory, and other scientific disciplines.

Figure 1. The Athena temple complex, including the Delphic Tholos. With the Pleistos River Valley in the background (URL1)

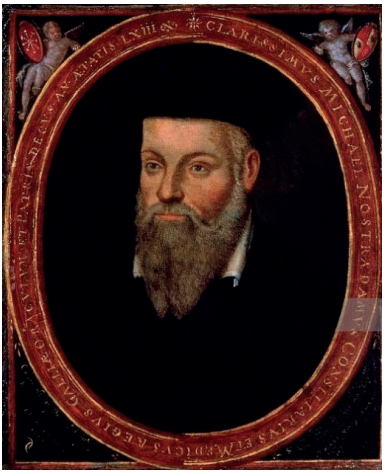


Figure 2. Nostradamus (URL 2)

Knowing about the future was also important to the Romans, who had a great tradition of bird divination. The augurs (bird seers) made predictions based on the sounds, flight, etc. of birds. People in the Middle Ages were no different from the people of antiquity. The most famous seer of the Middle Ages was the French doctor NOSTRADAMUS (1503-1566) (Figure 2), who wrote four-line poems about what would happen in the coming centuries.

Some say that Nostradamus predicted the French Revolution (1789), the First World War (1914-1918), the Second World War (1939-1945), the September 11 terrorist attacks (2001), and other events.

'The sky will burn at forty-five degrees.
Fire approaches the great new city.
By fire, he will destroy their city,
A cold and cruel heart, blood will pour.
Mercy to none.' (URL 3)

Some believe that the above poem predicted the September 11 terrorist attacks. In the case of nomadic peoples, soothsayers and shamans were 'tasked' with seeing into the future, and fell into trances by means of various intoxicating plants to do so.

People today are as interested in knowing the future as they were thousands of years ago. Today, however, we use scientific methods to examine past and present events, which – albeit with a certain margin of error – can help us to know the future.

2.1. The Roots of Predictive Forecasting

The idea of predicting crime has long preoccupied researchers, and over a hundred years ago, some attempted to identify potential criminals scientifically. Most notable among these was CESARE LOMBROSO (1835-1909), a Turin-based medical and criminal anthropologist, who believed that it was possible to determine whether a given individual was a 'born criminal' or not based on external physical and physiological characteristics. The doctor's findings were soon refuted by science, but the history of criminology still preserves his memory.

Among the predictive developments of the past few decades, it is necessary to mention first the various police models (philosophies).

- PROBLEM-ORIENTED POLICING (POP), developed by the American HERMAN GOLDSTEIN (1979), advocates the exploration of various threats that exist in society, which gives local police agencies a wide range of autonomy to deal with problems. The profession, expert work, and scientific analyses play prominent roles in the exploration and solution of problems. The theory was expanded by JOHN E. ECK and WILLIAM SPELMAN in 1987, placing greater emphasis on research, analysis, and crime prevention (Szikinger, 2016; Christián, 2022; Kozáry, 2007).
- EVIDENCE-BASED POLICING (EBP) was an important step on the path to predictive policing and drew attention to the importance of statistical analysis and empirical research. The development of the model can be attributed to the American criminologist LAWRENCE SHERMAN. EBP accepts traditional policing tools; but, it highlights attention to the importance of scientific analysis (URL4, Szikinger, 2016).
- Continuing the evolution of predictive policing, the next stop was the Compstat model. The term COMPSTAT is a portmanteau of the words 'computer statistics'. The New York City Police Department first used it under the leadership of Police Chief WILLIAM J. BRATTON (Figure 3).

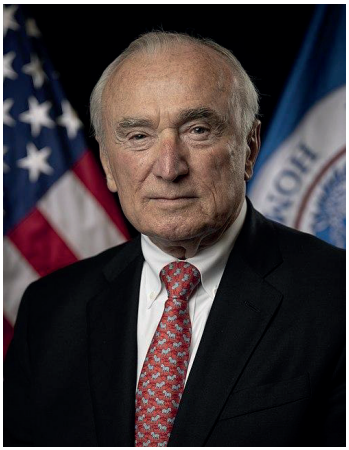


Figure 3. William J. Bratton (URL 5)

To analyse crime data, Bratton built a computer system that helped locate the most dangerous areas (hotspot mapping) and track crime trends.

The analyses were conducted on a monthly basis, and policing strategies were developed for each area.

One of the most impressive results was that the number of homicides in New York City fell by about half between 1995 and 2003, from 1,181 to 596. 'We didn't just react to crimes; we predicted them,' said William J. Bratton in an interview (Sárosi, 2008; Visnovitz, 2011). In other words, this model can already be considered the precursor of predictive policing.

- INTELLIGENCE-LED POLICING: In this model, the collection, systematic processing, and use of information for public safety and protection have become a fundamental and defining element of police work. The terrorist attack on the United States on September 11 2001 and the related law enforcement deficiencies drew attention to the need and urgency of developing intelligence-led policing. The police model is a collaborative performance task that combines the systematic collection and evaluation of data with the long-standing practice of community policing and problem-oriented policing. Data collection and processing must serve to address community problems.

  The data generated during the activity – and this also applies to the results of secret information collection – do not remain within the scope of law enforcement data management, surrounded by secrecy walls, but are used in the interests of law enforcement and crime prevention (Korinek, n.d.). The Hague Programme adopted in the European Union in 2004 also set the goal of implementing this model at the EU level (Boda, 2019, p. 279).

- HOTSPOT POLICING is one of the most important precursors of predictive policing, based on crime mapping. Hotspot policing is a policing strategy that developed after the recognition of crime hotspots and 'aims to proactively reduce the crime rate in the affected area. One of the key elements of the

strategy is to ensure an increased, demonstrative police presence' (Mátyás, 2019, p. 205).

- CRIMINAL PROFILING is possible using past criminal data. Profiling is a forensic method used to identify unknown perpetrators. It is based on the recognition that personality determines behaviour, and that behaviour can be used to infer personality (Petrétei, 2020).

> *The essence of profiling is to provide characteristics of the unknown perpetrator and his/her actions that can be used to select a suitable person from among those already in sight or to search for a suitable person in the victim's narrower or wider environment. The completed profile shows what type of person the perpetrator may be.* (Boda, 2019, p. 449)

During profiling, experts use behavioural science to try to predict the offender's next 'step' (e.g., victim and crime scene). In this case, the question we ask during the investigation is not 'who' we are looking for but 'what kind of' person we are looking for. In other words, profiling can also be considered a type of predictive technique, as it can also provide information about the future.

Profiling also involves identifying the common characteristics of offenders based on known cases over a specific period. This process helps in determining which individuals are likely to be perpetrators of a particular type of crime. It is crucial to note that while we cannot predict with certainty that specific individuals who fit a given profile will commit crimes, we can assert that individuals matching the profile – such as air passengers – are statistically more likely to be, for example, drug couriers than others. If our selection successfully identifies perpetrators based on their profile, it indicates that the profiling method is effective. However, if we consistently encounter false positives (wrongly identifying innocent individuals) or false negatives (failing to identify actual offenders), then we need to review or even discard the existing profile and apply new ones. The group of randomly selected passengers can be narrowed down by

the customs authorities who utilise such profiles. This process allows us to confidently state that the individuals remaining in the group are more likely to be couriers compared to any randomly selected set. Additionally, this narrowing process enables us to allocate law enforcement resources more effectively to manage the individuals identified (Zagon and Gecsei, 2021).

The German Federal Criminal Police Office (BKA) developed a similar investigative technique in the 1960s, referring to it as 'raster investigation'. Unlike traditional investigations, which focus on a known suspect, raster investigation aims to reduce the number of individuals to be checked in several stages. This is achieved by filtering certain groups from public and private databases, searching for characteristics unlikely to apply to the person being sought. Consequently, this procedure decreases the number of individuals that law enforcement agency needs to examine while increasing the proportion of potential targets within the sample (Schewe, 2006).

These profiling techniques may also be of interest to predictive policing, as they can reduce the uncertainty of our view of the future.

2.2. Civilian Antecedents of Predictive Policing

As is true of many methods and procedures used in the field of policing, the civilian sphere was where they were originally developed and then applied, and only later did the procedure seep into the field of policing. This was also the case for predictive policing. Noticing the effectiveness of preventive software used in the civilian sphere (commercially), police experts utilised preventive software to enhance crime detection and prevention.

In the United States, large commercial companies were first to start studying consumer behaviour and habits. They noticed that, in some cases, consumer habits changed significantly, so they collaborated with universities to

develop software that could predict future consumer behaviour with a certain percentage of accuracy.

Many American companies have begun to address this area, as predicting expected purchasing habits can lead to significant additional profits. On one hand storage costs can be reduced, and on the other hand, shortages of a given product can be prevented. In almost all cases, the literature on predictive policing highlights the American giant WALMART – a leader in predictive research – as a company that practically founded American predictive policing.

The experts at this American chain store noticed that meteorological (weather) conditions significantly influence both the desire to purchase and the range of products bought. Weather events can include, for example, a sudden shift in cold or warm air masses, a significant amount of precipitation, or strong winds. There is a clear link between weather and the range of products purchased in some cases. For example, we can consider the relationship between rainy weather and the number of Wellington boots or umbrellas sold, or snowfall and the number of snow shovels sold. However, there are products for which it is extremely difficult to find a link between weather and the given product type. Examples of such products – which Walmart employees also noticed – include STRAWBERRY POP-TARTS and duct tape, among others.

In these cases, it is evident that a more thorough analysis of shopping habits was required. The goal was to predict shopping habits using statistical methods, to prepare for expected increases in demand, and more precisely determine their future sales strategy (Figure 4) (Perry et al., 2013).

Figure 4. Strawberry Pop-Tarts (URL 6)

Finally, regarding civilian use, let us mention the large utility companies, which, long before law enforcement applications, also utilised statistical methods to predict where pipelines (e.g., water, oil, and gas pipelines) would fail and when consumption would be highest (e.g., electricity, water).

Nowadays, forecasts are widely used in business, so we find software that attempts to predict the exchange rate of individual currencies, the development of the global wheat market price, or the expected sales of various pastries in a given area. The method has worked effectively in commerce and is still working today, and its application is becoming more widespread. Upon learning of the method, American police experts drew an analogy between shopping habits and future crimes, so they began to use computer programmes to model the expected locations and times of crimes, as well as the groups of perpetrators and victims.

2.3. A Hungarian Innovation: the Public Police Service Support Program (BÖBE)

2.3.1. Factors Forcing the Development of the Software

The issue of crime prediction has also been a concern for law enforcement professionals in Hungary. Especially in the period following the change of regime (after 1989) when crime rates increased significantly over a few years, and the police were unable to respond successfully to the ever-increasing crime rate for a long period. To illustrate the gravity of the problem, the number of crimes

increased 2.7 times over a decade (Mátyás, 2017a). The drastic quantitative and qualitative change in crime affected the entire country, and the capital in particular where the crime rate was well above the national average even before the change of regime.

One of the acts that most severely damaged the population's subjective sense of security was vehicle theft. The capital was most affected by the crime. The territorial concentration of vehicle thefts and the severity of the problem are well illustrated by the fact that, during the period in question, more than 80% of vehicle thefts were committed in the city of Budapest and Pest County (Mátyás, 2011). Vehicle thefts affected different districts of the capital to varying degrees. The Budapest Police Headquarters (BRFK) District III Police Headquarters was among the most seriously affected districts, in which several vehicles were stolen daily.

2.3.2. The Birth of Böbe

To address the acute problem, Attila Markó, then head of the BRFK III District Police Headquarters, supported all possible new ideas that could be expected to reduce car thefts. In the 2000s, one of the deputy heads of the headquarters was Lieutenant Colonel FERENC TRAUB (Figure 5). He believed that a computer program could predict where and what type of crime would be committed in the future based on past crime data (Traub, 2005). The decision was followed by action, and after completing the office work, several months of endeavour followed.

Figure 5. Lieutenant Colonel Ferenc Traub (retired), 'father of predictive policing'

In his free time, and without any remuneration, Traub created the software known as 'the Public Police Service Support Program' in 2004 (in practice, the software became operational in April 2004).

At this point, it's worth pausing for a moment to consider the date: 2004. This is evidently the world's first predictive software, (Mátyás, 2017b), yet all the English-language sources published so far have cited the American PredPol software (or its predecessor) as the world's first predictive software. Clearly; this is a mistake, first place belongs to this Hungarian cop, Ferenc Traub.

Several people helped him in his work, including Lieutenant Colonel Attila Markó and Lieutenant Colonel Ferenc Rácz. The development work took place at Ferenc Traub's home, often through the night. Once the program was up and running, the developers had only one 'task' remaining, to name the predictive software: they came up with BÖBE (pronounced 'bø:bɛ).

So while the official name of the software is 'the Public Police Service Support Program', everyone called it Böbe. The reason for this was that Ferenc Traub's wife, Erzsébet, was nicknamed Böbe. The creators of the software were grateful to her, as she had prepared food and drink for them during the development. As a sign of their gratitude, Böbe became the unofficial name of the world's first predictive software (Mátyás, 2017b).

2.3.3. The Police Service Support Program in Practice[3]

This Hungarian software was employed operationally from 2004, although it underwent continual modification with Ferenc Traub incorporating user ideas and concepts into it. The software enabled the prediction of the following crime types, which significantly influence the subjective sense of security of the

[3] This chapter is based on the work and oral communication of Ferenc Traub (2004) entitled Documentation on the Public Police Service Support Program.

population: car break-ins, car theft, robbery, burglary, and fraudulent theft. Böbe assisted the police in the following areas:

- Organising daily public patrols
- Planning of operations and raids
- Preparing for district commissioner meetings
- Selecting the optimal location for surveillance cameras
- Planning the weekly service of the district commissioner and patrol staff

.The installation of the program requires several simple, logical steps: uploading the street names, district commissioner districts, area names, housing estate names, and other relevant information. The initial database demands approximately 30 days of crime data, and one important condition for use is that the uploaded data must be constantly updated because otherwise the forecast may be misleading. The data entry itself takes only a few seconds for each crime. In the case of an average-sized police station, only a few of the above crimes are committed each week, meaning that only a few minutes are spent daily on entering the data.

The program allows for various searches, including the location and timing of each type of crime. It is possible to determine the streets on which the most crimes have been committed, and the streets are sorted in descending order. It is also possible to examine the infection rate of each police station, and by predating the days of the week, you can see where crimes can be expected to be committed in the coming week for police stations.

Böbe ranks the percentage of each crime occurring on each day of the week. The practical benefit of this lies primarily in the fact that the commander

can foresee when it is possible to for leave to be taken when the fewest crimes are anticipated.

The operating principle of the software is based on probability calculation and standard deviation, with the number of crimes per day of the week in a special constellation. The probability of a crime occurring is calculated from all the data in the database. Similarly to 'dice theory' (where 1 to 6 rolls of the dice can be taken), instead of the six sides of the cube, the 640 streets of the 3rd district are substituted, so 'Böbe's dice' has 640 sides. In the case of this program, the rolls corresponding to the sides are replaced by the number of crimes committed on the streets.

The software asks how many patrol pairs are available on duty that day. Based on that, it specifies the streets where crime is most likely to occur. In optimal conditions, one patrol pair can cover approximately 8-10 streets, giving them a chance to catch the perpetrators of crime. One of the virtues of the program is that it compiled a ready-made action plan that stated who, when, and where to go. The action plan was automatically provided with a header and the names of the action leader. Regarding the program's effectiveness, it can be stated that at the time of its application, it predicted 30% of the five crime categories mentioned above.

The Óbuda Hajógyári Sziget (Óbuda Shipyard Island) is situated in the territory of Budapest's 3rd District Police Department, where Europe's largest open-air music event, the Sziget Festival, has been held since 1993, attracting hundreds of thousands of Hungarian and foreign tourists. The organisation of external security was the responsibility of the 3rd District Police Department until 2015. With the help of the Böbe software, it was possible to identify the streets where the most crimes had been committed during the festival in previous years. As a result, the number of crimes committed in the area around the festival has

decreased significantly since 2010. In fact, in some years, none of the crimes predicted by the software were committed.

Foreign delegations visiting the police station (e.g., from Austria, Germany, England, and the Netherlands) recognised the novelty and applicability of the Böbe software and took it back to their home countries. Neither the software developer nor the author has any relevant information about its use abroad (Molnár, 2016).

2.3.4. The Afterlife of the Böbe Software

The Böbe software was in operation from April 2004, and it was demonstrably years ahead of other software abroad operating on a similar principle, so it can be said that the police officers of the 3rd district were ahead of the Americans and the Italians in creating their program; and they did it alone, with neither professional nor financial assistance.

After Ferenc Traub's retirement, the software continued in use for years, thanks to Lieutenant Colonel Ferenc Rácz. However, when Rácz also left the police station, the new management did not invest any effort in entering new data, so it fell into disuse.

In summary, we can say that at the time of its creation (2004), the BÖBE software was a singular idea in the world, as this type of predictive program had not been used in the field of law enforcement anywhere else. Both the idea itself and its implementation were unique.

2.4. The Birth of American Predictive Software

Methods for predicting crime have been available for a long time; however, modern technology has only recently developed the mathematical algorithms necessary for this purpose. In connection with the creation of the predictive

policing model, we must also highlight the name of WILLIAM J. BRATTON, who served as the police chief of Los Angeles. In 2008, Bratton spoke extensively about the successes of the Los Angeles Police Department, also mentioning that they had developed a new method for predicting gang activity and tracking real-time crime. The research was initially conducted by the Los Angeles Police Department and UCLA, from which the software known as PredPol later grew (Perry et al., 2013). The second functional predictive software, which can be considered the forerunner to the PredPol software, was completed in 2006.

In testing and further developing the method, Bratton worked closely with JAMES H. BURCH II, Director of the Bureau of Justice Assistance, and KRISTINA ROSE, Director of the National Institute of Justice (NIJ), to study the new concept and draw conclusions for law enforcement agencies. During this time, two symposia were organised at NIJ. The first was in Los Angeles in November 2008, where Kristina Rose emphasised Bratton's role as a catalyst for the rise of predictive policing in her opening speech. She also mentioned that there was already a huge interest in learning about the new method across the United States. Among others, the heads of the police forces of Boston, Chicago, Los Angeles, the Metropolitan DC area, New York, and the Maryland State Police indicated that they would participate in predictive policing research and would be happy to serve as sample areas for experimental research. In addition to professional police organisations, the media, software manufacturers, and the executives of private security companies soon showed great interest (Perry et al., 2013).

The second symposium was held in Providence, Rhode Island (USA), where there was general agreement that predictive research needed to be continued and developed. Participants emphasised that further results could only be achieved if data sharing between police agencies was enhanced, regionalisation was strengthened, and strong analytical capacity was created (Perry et al., 2013).

In the two years following the second symposium, interest in predictive policing exploded. This was partly due to the media's exaggerated influence on predictive methods. A predictive software package called PredPol was reported (or at least alluded to) by several television networks and newspapers (e.g., CBS Evening News, *The New York Times*, and the NBC Nightly News) as predicting precisely where crimes would occur (Figure 6.)[4]

By BOB ORR / CBS NEWS / April 11, 2012, 8:40 PM

LAPD computer program prevents crime by predicting it

Share / Tweet / Reddit / Flipboard / Email

The L.A. police department's "Predictive Policing" computer program in Los Angeles, California. / CBS NEWS

(CBS News) LOS ANGELES - The Los Angeles Police Department has gone on an offensive to prevent crime.

Its latest weapon is a program that can actually predict where crimes will happen. CBS justice correspondent Bob Orr has a first look at the results.

In the Foothill Division, north of downtown Los Angeles, police are patrolling largely working class neighborhoods with specially-marked maps.

The small red squares are "hot spots" where computers project where property crimes are most likely.

In one of its advertisements, IBM – although not seriously claiming this as a possibility – showed a police officer arriving at the scene of a crime before the perpetrators did thanks to data analysis (Perry et al., 2013).

Figure 6. A misleading article: Los Angeles Police Department computer program predicts crime (URL 7)

References

AVEN, T. (2016). Risk assessment and risk management: Review of recent advances on their foundation. *European Journal of Operational Research*, 253(1), 1–13. (https://doi.org/10.1016/J.EJOR.2015.12.023)

BERNSTEIN, P. L. (1996). *Against the Gods: The Remarkable Story of Risk*. Wiley.

[4] NB. The PredPol software was marketed under the name Geolitica from 2021, and its distribution was discontinued in 2023.

BODA, J. (ed.) (2019). *Rendészettudományi Szaklexikon* [Law Enforcement Lexicon]. Dialog Campus, Budapest (https://real.mtak.hu/153920/1/743_Rendeszettudomyanyi_Szaklexikon_e_2020_04_28_.pdf)

CHRISTIÁN, L. (2022). *Komplementer rendészet* [Complementary Policing]. Ludovika Kiadó, Budapest

KOZÁRY, A. (2007). *Rendészeti politológia II.* (Law enforcement political science II) Rendőrtiszti Főiskola, Budapest

MÁTYÁS, SZ. (2019). Forrópont [Hotspot]. Boda József (ed.). *Rendészettudományi Szaklexikon*. Dialog Campus, Budapest (https://real.mtak.hu/153920/1/743_Rendeszettudomyanyi_Szaklexikon_e_2020_04_28_.pdf)

MÁTYÁS, SZ. (2017a). Magyarország általános bűnözésföldrajzi helyzete [The general crime geography situation in Hungary]. *Hadtudományi Szemle*, 10(4), pp. 497-505. (https://epa.oszk.hu/02400/02463/00037/pdf/EPA02463_hadtudomanyi_szemle_2017_04_497-505.pdf)

MÁTYÁS, SZ. (2017b). A térinformatika a hazai rendvédelmi szervek gyakorlatában [Geoinformatics Practice in Hungarian law enforcement agencies]. In: Balázs Boglárka (ed.): Az elmélet és a gyakorlat találkozása térinformatikában VIII. Debreceni Egyetemi Kiadó, Debrecen, pp. 217-222.

MÁTYÁS, SZ. (2011). *A Debreceni Rendőrkapitányság kriminálgeográfiai elemzése* [Criminal geography analysis by the Debrecen Police Department]. Ph.D. dissertation, University of Debrecen

MOLNÁR, B. (2016). Térinformatika – Közterületi szolgálatot támogató program – BÖBE [Geoinformatics – Public Service Support Program – BÖBE].

PERRY, L. W., MCINNIS, B., PRICE, C. C., SMITH, C. S. & HOLLYWOOD, S. J. (eds.) (2013). *Predictive Policing: The Role of Crime Forecasting in Law Enforcement Operations*. Rand Corporation, Los Angeles (https://www.rand.org/pubs/research_reports/RR233.html)

PETRÉTEI, D. (2020). Elkövetői profilalkotás és a bűnügyi helyszín elemzése [Offender profiling and crime scene analysis]. *Rendőrségi tanulmányok*, 3(1), pp. 3-49. (http://epa.niif.hu/04000/04093/00009/pdf/EPA04093_rendorsegi_tanulmanyok_2020_1_003-049.pdf)

SÁROSI, P. (2008). 'Zéró tolerancia' [Zero tolerance]. *Beszélő* (http://beszelo.c3.hu/cikkek/%E2%80%9Ezerotolerancia%E2%80%9D)

SCHEWE, C. S. (2006). Rasterfahndung. In H.-J. Lange & M. Gasch (eds.), *Wörterbuch zur Inneren Sicherheit* (1st Ed., pp. 263–267). VS Verlag für Sozialwissenschaften, Wiesbaden.

SZIKINGER, I. (2016). Előrelátó rendőrség [Forward-thinking police]. In: FINSZTER G., KŐHALMI, L. & VÉGH ZS. (eds.): *Egy jobb világot hátrahagyni…* Pécsi Tudományegyetem Állam- és Jogtudományi Kar. Pécs, pp. 558-567.

TRAUB, F. (2004). Dokumentáció a közterületi rendőri szolgálatot támogató programról [Documentation on the program supporting public police services].

TRAUB, F. (2005). Újítási javaslat az ORFK 15/2005. (VIII.23.) utasítása alapján [Proposal for renewal based on ORFK instruction 15/2005. (VIII.23.)].

VISNOVITZ, P. (2011). A világ legjobb bandaszakértőjét importálja a sokkolt Anglia [Shocked England imports world's best gang expert]. (http://www.origo.hu/nagyvilag/20110815-william-j-bratton-a-britek-altal-segitsegul-hivott-amerikai-szuperzsaru.html)

ZAGON, C., & Gecsei, M. (2021). Kockázatelemzés a gyakorlatban: Cigaretta a repülőtéren. [Risk analysis in practice: Cigarettes at the airport] In V. Czene-Polgár, C. Zagon, A. Szabó, & Á. Zsámbokiné Ficskovszky (eds.), *Tradíció, tudomány, minőség: 30 éves a Vám-és Pénzügyőri Tanszék* [Tradition, science, quality: 30 Years of the Customs and Excise Education Department] (pp. 129–142). Magyar Rendészettudományi Társaság Vám- és Pénzügyőri Tagozata, Budapest. (https://doi.org/10.37372/mrttvpt.2021.2.7)

URL 1: https://en.wikipedia.org/wiki/Delphi#/media/File:Delphi,_Greece_-_panoramio.jpg

URL 2: https://hu.wikipedia.org/wiki/Nostradamus#/media/F%C3%A1jl:Nostradamus_by_Cesar.jpg

URL 3: https://www.standard.co.uk/lifestyle/nostradamus-predictions-come-true-hitler-world-trader-center-b1202038.html

URL 4: https://www.policinginstitute.org/wp-content/uploads/2015/06/Sherman-1998-Evidence-Based-Policing.pdf

URL5:https://commons.wikimedia.org/wiki/File:William_Bratton,_official_portrait,_Homeland_Security_Council.jpg

URL 6: https://www.poptarts.com/en_US/recipes/no-bake-strawberry-pop-tarts-cheesecake.html

URL 7: https://www.cbsnews.com

About the Authors

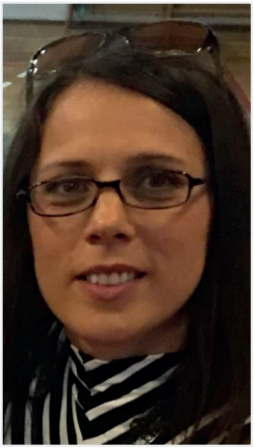
Zoltán György Bács, a D.Univ. in History and Ph.D. in Military Sciences, Dr. Bács is assistant professor of the Ludovika University of Public Service and the Head of the Secretariat of the Vice Rector for International Affairs. The author of almost seventy publications in four languages, he specialises in terrorism, national security, dynamic networks as innovative assessment and evaluation systems, radicalization, as well as drug problems and organised crime in Latin America.

He has previously served as a diplomat in Moscow, Kiev, Baku, Minsk and Buenos Aires. Between foreign assignments, he worked for international and national private companies in Hungary. Dr. Bács is fluent in Spanish, English and Russian.

Anita Bückő has been working in various fields of security for over a decade. She studies artificial intelligence and predictive analytics solutions, with a particular focus on their integration into physical security systems. The centre of her attention lies in the examination of the security structures of law enforcement, municipal policing, and multinational corporations. She believes that the true significance and value of numerical data lies in revealing strategic advantages, predictive insights, and preventive opportunities. Her goal is to develop prediction-based security systems that contribute to strengthening organisational security and enhancing the effectiveness of crime prevention.

Orsolya Czenczer Ph.D. is a legal professional and academic specialising in national and international prison law and penology. She is an associate professor and correctional lieutenant colonel at Ludovica University of Public Service, teaching and researching since 2008. Her work focuses on prison systems, criminal justice reforms, and European legal policy. She represents Hungary at the Council of Europe's Penological Co-operation Council. She holds law degrees from Hungary and Romania, a Ph.D. in Criminal Law, and a psychology degree. Early in her career, she practiced criminal law and was a Ph.D. research fellow. Fluent in English, Italian, and Romanian, she applies strong intercultural skills in international and academic settings.

Csaba Zágon Ph.D., is dedicated to enhancing the academic performance and international visibility of the Law Enforcement Faculty at Ludovika University. He contributes to European Commission programmes focused on the advancement of higher education in law enforcement. His involvement includes participation in CEPOL's Research and the Science Correspondents' Network. With over thirty years of experience as a former customs officer, he has engaged in capacity building across EU Member States and Accession States. For more than a decade, Dr. Zágon has taught cadets, mid-level law enforcement practitioners, and civilian candidates in various Bachelor's, Master's, and Doctoral programmes. His research interests include risk management in law enforcement environments, crime analysis, international cooperation in criminal matters, and infrastructure networks.



Zsanett Fantoly Ph.D. is a law professor at the Ludovika University of Public Service, specialising in criminal justice systems and the efficiency of the criminal procedurals. She teaches courses on the Hungarian and the European Union's criminal law of proceedings in addition to AI decision-making in criminal cases. She is the author of numerous scientific studies and books, and a regular speaker at domestic and international conferences.

A member of several scientific societies (e.g. International Association of Penal Law) she is also committed to modern legal education and scientific research in her public life.

István Giczi is a security technology engineer, senior security coordination expert, and AI engineer with extensive experience in integrated security systems and risk management solutions. His professional focus is on the practical application of artificial intelligence, particularly predictive analytics, machine learning, and image analysis.

He applies an engineering mind-set and data-driven approach to enhance security system development, leveraging innovative technological opportunities. His core belief is that the true value of technological advancements lies in their ability to effectively address real-world problems.

Kristina A. Krasnova Ph.D. Cand. Sci. (Law), Associate Professor

Associate Professor of Criminal Law Department, North-West branch of the Federal State Budgetary Educational Institution of Higher Education "Russian State University of Justice named after V.M. Lebedev" (St. Petersburg)

Chair of the St. Petersburg Branch of the Russian Criminological Association named after A.I. Dolgova. Vice-President of the International Criminological Geographical Association (ICGA). Independent Expert, authorized by the Ministry of Justice of Russia to conduct anti-corruption expertise of normative legal acts and draft normative legal acts in cases stipulated by the legislation of the Russian Federation. Member of the Editorial Board of the journal Member of the Editorial Boards of the journals "Bulletin of the Academy of Law and Management" (Russia), "Criminal Geographical Journal" (Hungary), "European Law Announcements" (Hungary).

Róbert Major Ph.D. A police colonel, associate professor, and head of the department of Public Safety of the Ludovika University of Public Service, as well as a traffic engineer, lawyer, traffic engineering specialist, road safety auditor. He has been dealing with the opportunities for preventing traffic accidents for decades, with a particular focus on police activity. His research areas include the examination of the adequacy of traffic engineering designs, the methodology, techniques and tactics of road traffic control, as well as the safety of pedestrians and other vulnerable road users. He has published numerous publications on these topics and regularly gives scientific lectures. He is a member of and senior official for several scientific societies.

Szabolcs Mátyás Ph.D. is a police lieutenant colonel and an associate professor at the Ludovika University of Public Service. He obtained a degree in geography and regional development at the University of Debrecen in 1999, a Ph.D. in 2011, completing his habilitation in 2023. Alongside his role as associate professor he also teaches at the University of Debrecen. He lectures on the Predictive Policing course in both English and Hungarian, and is the author of numerous studies on the subject. He led the research team that developed the predictive traffic policing software Sopianae. A member of the editorial board of several Hungarian and international scientific journals, he is also the founder and editor-in-chief of the *Criminal Geographical Journal* and *Bűnözésföldrajzi Közlemények*, the world's only English and Hungarian language crime geography journal. He was the founder and Vice President (formerly President) of the International Criminal Geographical Association.

Endre Nyitrai Ph.D. A researcher, associate professor, and acting head of department, Dr. Nyitrai earned his degree in criminal investigation from the College of Police Officers in 2004. He went on to graduate from the Faculty of Law at the University of Pécs. From 2004 to 2012, he served with the Organised Crime Division of the Budapest Metropolitan Police Headquarters, followed by a post at the Pest County Police Headquarters. Since 2013 he has been a member of the teaching staff at the Ludovika University of Public Service. He obtained his Ph.D. in 2018. He has presented extensively both domestic and international conferences. His current research interests include smart cities and smart policing, artificial intelligence, and criminalistics/forensic science.

Máté Sivadó Ph.D., A police major, associate professor, doctorate in law, police officer, university lecturer, and researcher, he has more than 20 years of practical experience in law enforcement work and training. He is an associate professor at the Department of Criminology of the Faculty of Law of the University of Public Service. In 2015, he defended his doctoral dissertation entitled 'Drug Policies in Hungary and Europe, with an overseas perspective.' Alongside a published monograph, he has over a hundred independently and jointly written publications to his credit. His main research areas continue to be drug policy, law enforcement crime prevention, and the impact of religious conversion on prisoners. He has participated in numerous professional trips abroad and regularly visits foreign universities to teach within the framework of the Erasmus program. He speaks English at an intermediate level.

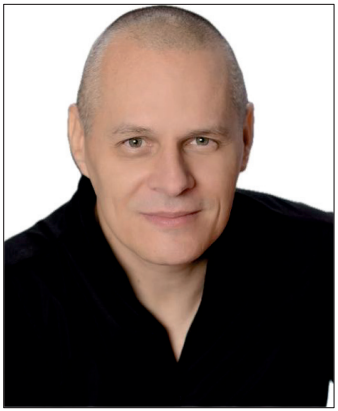
Imre Szabó Ph.D., is a prosecutor at the Metropolitan Chief Prosecutor's Office. He is a member of the National Association of Prosecutors, who, in addition to his prosecutorial work, is also engaged in scientific research and teaching activities. He teaches the 'Predictive Policing' course at the Doctoral School of Law Enforcement of the Ludovika University of Public Service, His main research area is predictive policing. In addition, he researches criminal law, with a particular focus on cybercrime. He regularly participates in Hungarian and international conferences and has published studies in Hungarian, English, and German.

Nikiforosz Packosz is a Ph.D. student at the University of Public Service in Hungary. He holds degrees in law and law enforcement. Over the course of a 12-year investigative career, he spent 8 years at the National Bureau of Investigation, specialising in organised crime and crimes related to online payments. During this time, he served for several years as a delegated national expert in the EUROPOL EMPACT working group on non-cash means of payment fraud. After leaving the field of law enforcement, he worked as a legal advisor in the private sector. He is currently employed at the Office of the President of Hungary. His continued Ph.D. studies reflect his strong commitment to the field of law enforcement.

Miklós Tihanyi Ph.D. A police lieutenant colonel and associate professor at the Ludovika University of Public Service, lecturing at both the Faculty of Law Enforcement of the Ludovika University of Public Service and at the Károli Gáspár University of the Reformed Church. His areas of expertise are law enforcement and church law. His research focuses on public safety, organisational efficiency, and the relationship between religion and law enforcement. He is a member of the editorial boards of several Hungarian and international journals and serves as the president of the International Criminal Geographical Association. He has taught as an Erasmus instructor in many countries around the world. He has published his research findings in Hungarian, English, Serbian, and Russian.

Levente Tóth Ph.D. is an assistant professor at the Department of Private Security and Municipal Policing at the Faculty of Law Enforcement, Ludovika University of Public Service. He has been teaching at universities for 27 years. Alongside his academic career, he has gained 35 years of experience working in the private security sector and is currently the Operational Director of one of the largest security companies, which specialises in the installation of intrusion detection, video surveillance, access control, and fire alarm systems. His main research interests include video surveillance systems and artificial intelligence-based image processing (video content analysis).

Zita Traub is a second-year BA student at the Ludovika University of Public Service, where she is studying International Public Management. She has shown a keen interest in computer science since her high school years and was part of the university research team that developed the Sopianae software system that operates based on predictive algorithms. In 2024, she designed the structure of the traffic safety software operating in Pécs. She has published several studies on this program in both English and Hungarian. She has also participated in numerous Hungarian and international conferences.



Endre Vajda is a former police officer and certified criminologist. He is currently the CEO and owner of a security company. In addition to his police degree, he has participated in several multi-week online training courses held by renowned universities and training institutions around the world on the topic of terrorism and security policy. His research interests include crime geography and Islamic terrorism. He has published numerous articles in English and Hungarian on the above topics. He is a high-level martial arts practitioner, a 3rd Dan Kempo and 2nd Dan Ju Jitsu master.

Vince Vári Ph.D., a lieutenant colonel and associate professor at Ludovika University of Public Service, and a leading figure in the study of police organisational effectiveness in Hungary. He has pulished more than 170 scientific works, with around 300 independent citations recorded in the MTMT (Hungarian Scientific Works Database, ID: 10033318). His research has appeared in several peer-reviewed, Q-ranked academic journals, and he is also the author of multiple monographs, including works published in foreign languages. Dr. Vári is actively engaged in professional and public life, serving as editor-in-chief or board member on prominent Hungarian and international journals, and as a member of major scientific societies. His research contributions and academic leadership have been acknowledged through several professional awards. Currently, he is preparing his habilitation, further strengthening his academic achievements and influence in police science.

Contents

The research presented in this paper focuses on various aspects of the application of artificial intelligence in predictive policing.

Since profiling is already used to identify perpetrators of crimes, the examples included in the paper, although mostly drawn from the Hungarian experience, demonstrate its usefulness in prevention, as well as the technical, forensic, legal, and ethical implications.

The considerations presented in various areas inspire the use of AI that conciliates crime prevention, fundamental rights and the rule of law.

Using AI to obtain a more precise profile in time and space, while maintaining the final interpretation by a human being, enables a better identification of risks and potential perpetrators, and consequently, protects both the security and freedom of citizens.

Yves Vandermeer
founder of the European Cybercrime
Training and Education Group