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CRIMINOLOGICAL FORECASTING IN CONTEMPORARY CRIMINAL JUSTICE

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Abstract: This article is devoted to the analysis of the definition of forecasting in Criminology, the significance of it in the modern world, a brief developing history of criminological prediction, methods of forecasting along with international practice.

The author demonstrates the need and importance of improving legal norms related to prediction in criminology,drawing on international legal experience, the opinions of scholars, and legislative norms in the field and their analysis.

Keywords: criminology, forecasting, legislation, law, predictive policing, risk assessment.

Introduction. Crime prevention has been undoubtedly the core goal of every criminal justice systems in the whole world, addressing the root cause, yet the consequences. Ensuring the rights and freedoms of citizens, the legitimate interests of society and the state are important criteria for a democratic legal state, and it is worth noting that rule and regulations are being implemented in our country in this regard, especially the improvement of legislative norms based on the principles of humanity and democracy. In particular, the decision“On Measures of Scientific Support of Criminological Acticity” was approved by Cabinet of Ministers of Republic of Uzbekistan, and the creation of effective legal mechanisms for the prevention and elimination of crimes, instilling a high legal culture in citizens, and educating them in the spirit of following the Constitution and laws were identified as one of the priority areas of these reforms.

Criminal justice systems in most countries operate under significant resource pressure. Police forces face demands to do more with less; courts manage expanding caseloads; prisons are frequently overcrowded. Forecasting offers the prospect of allocating limited resources more intelligently — directing patrol units to higher-risk areas, identifying defendants genuinely in need of supervision rather than detaining everyone who cannot afford bail, or prioritising rehabilitation programmes for those most likely to benefit. Moreover, the contemporary explosion in digital data has made forecasting both technically possible and practically attractive in ways that were impossible even two decades ago. Police departments now maintain comprehensive digital records of arrests, incident reports, calls for service, and stop-and-search contacts. When combined with publicly available databases — census data, economic indicators, social media activity — these records generate an enormous pool of information from which predictive models can learn. Advances in machine learning and artificial intelligence have further expanded the analytical toolkit available to criminologists and justice administrators, enabling the detection of complex patterns in data that no human analyst could discern manually.

Analysis. Before examining methods and applications, it is essential to establish clearly what criminological forecasting means, because the term is used in different ways by different scholars and practitioners.

Criminological forecasting can be defined as the systematic use of empirical data, statistical models, and analytical methods to generate probabilistic assessments of the likelihood of future

criminal events, criminal behaviour by identified individuals, or conditions conducive to crime, with the purpose of informing criminal justice decision-making (Perry et al., 2013).

From my perspective, three elements of this definition deserve attention.

First, forecasting is probabilistic, not deterministic. A forecast does not state that a given person will commit a crime or that a particular neighbourhood will experience a robbery. It states that there is an elevated probability of these outcomes given available information. This distinction is critical for lawyers and judges, because it means that no prediction tool can be treated as proof of future guilt — only as a guide to risk management.

Second, forecasting is systematic. It relies on structured methods — quantitative models, validated instruments, or formal analytical processes — rather than on intuition or individual officer judgment alone. This is what distinguishes it from informal 'gut feeling' policing, though critics argue that algorithms can encode the same biases as human intuition, but in a less visible form.

Third, forecasting serves decision-making across the entire criminal justice field: from police patrol allocation and arrest decisions, through pretrial detention and bail, to sentencing, parole, and offender rehabilitation. Understanding forecasting therefore requires an appreciation of the distinct institutional contexts in which predictions are generated and used.

Methods of Forecasting in Criminology - Criminological forecasting draws on a range of methodological traditions. The following overview covers the principal approaches currently in use, presented in terms accessible to legal scholars rather than data scientists.

1) Statistical and Actuarial Methods

The oldest and most established category of criminological forecasting relies on statistical analysis of historical data to identify factors — known as risk factors or predictors — associated with increased probability of criminal behaviour or victimisation. These factors are combined, usually through a mathematical formula or scoring table, into a composite risk score for an individual or a location.

Actuarial risk assessment instruments are the most common application of this approach in the adjudicative context. Tools such as the Offender Assessment System (OASys) in England and Wales, the Level of Service Inventory — Revised (LSI-R) used in Canada and many other jurisdictions, and the Public Safety Assessment (PSA) used in several American states all operate on this basic principle. They identify a set of variables — typically including prior criminal history, age, substance use, employment status, and family circumstances — that research has shown to correlate with reoffending, assign scores or weights to each variable, and generate an overall risk rating (low, medium, high) that informs decision-makers.

The strength of actuarial methods is that they are transparent, replicable, and grounded in empirical evidence. Their weakness is that they treat individuals as members of groups: a person's score reflects the average behaviour of people with similar profiles, which may not accurately reflect their individual circumstances or prospects.

2) Machine Learning and Artificial Intelligence

More recently, machine learning algorithms — a branch of artificial intelligence in which computer systems learn patterns from large datasets without being explicitly programmed with

rules — have been applied to criminological forecasting. These methods can process far larger volumes of data and detect more complex patterns than traditional statistical approaches.

Predictive policing platforms such as PredPol and HunchLab use machine learning to analyse historical crime incident data and generate probability maps indicating where certain types of crime are most likely to occur during a forthcoming time period. Recidivism prediction tools such as COMPAS similarly use sophisticated statistical modelling to generate individual risk scores from a wide range of input variables.

The principal advantage of machine learning approaches is their capacity to identify non-obvious predictive patterns in large and complex datasets. Their principal disadvantages — and these are significant legal disadvantages — are opacity and the difficulty of accountability. Many machine learning models operate as 'black boxes': they produce outputs (risk scores, crime forecasts) without providing an intelligible explanation of how the output was derived from the inputs. This makes it extremely difficult for defendants, lawyers, or judges to scrutinise or challenge the basis of a prediction, raising serious due process concerns.

3) Hotspot Analysis and Environmental Criminology

Hotspot analysis is a place-based forecasting method that identifies geographic areas — sometimes as small as a single street block — with disproportionately high concentrations of criminal incidents. Rather than predicting individual behaviour, hotspot analysis predicts where crime is most likely to cluster, allowing police departments to concentrate patrol resources in those areas.

The theoretical foundation of hotspot analysis lies in environmental criminology, and particularly in the routine activity theory developed by Cohen and Felson (1979), which holds that crime occurs when a motivated offender and a suitable target converge in the absence of a capable guardian. Because these conditions tend to be geographically stable — the same locations attract crime repeatedly due to their physical characteristics, land use, and social dynamics — historical crime patterns provide useful predictions of future concentrations.

Hotspot policing supported by geographic information systems (GIS) has become one of the most widely implemented and empirically supported forms of criminological forecasting. A substantial body of research, including systematic reviews and randomised controlled trials, finds that concentrating patrol in crime hotspots reduces crime in those areas, though debate continues about whether crime is genuinely prevented or merely displaced to adjacent areas.

International practice **- The United States:** Widespread Adoption and Legal Controversy. The United States is the country in which criminological forecasting has been most extensively developed, most widely deployed, and most intensely contested. American police departments, courts, and corrections agencies use a remarkable range of predictive instruments, and the country has been the site of landmark legal battles over their legitimacy.

In the policing context, predictive policing platforms have been adopted by dozens of major American cities. PredPol (Geolitica), developed by researchers at the University of California, Los Angeles, was deployed by departments including the Los Angeles Police Department and the Santa Cruz Police Department before the latter became the first US city to ban predictive policing outright in 2020, citing concerns about racial bias and lack of demonstrated effectiveness. The Chicago Police Department's Strategic Subject List — a person-based prediction tool that assigned risk scores to individuals deemed likely to commit or fall victim to

violent crime — was discontinued in 2020 after an independent evaluation by the RAND Corporation found no evidence of effectiveness and documented significant racial disparities in who was listed.

In the adjudicative context, the most important legal development has been the controversy surrounding COMPAS, the proprietary risk assessment tool developed by Equivant and used in pretrial, sentencing, and parole decisions across numerous states. The 2016 ProPublica investigation, which analysed COMPAS scores for approximately 7,000 defendants in Florida, found that Black defendants were nearly twice as likely as White defendants to be incorrectly labelled high risk for reoffending, while White defendants were more frequently incorrectly labelled low risk. These findings generated an enormous academic and public debate about the fairness of algorithmic risk assessment.[1]

The United Kingdom: Structured Integration and Emerging Oversight. The United Kingdom — and England and Wales in particular — represents a different model: one in which actuarial risk assessment has been more formally integrated into statutory criminal justice processes over a longer period, accompanied by a relatively developed governance framework, though one that is now facing new challenges from the emergence of more sophisticated algorithmic tools.

The Offender Assessment System (OASys) is the cornerstone of risk assessment practice in England and Wales. Developed jointly by the Prison Service and the National Probation Service and introduced in 2001, OASys is a comprehensive structured assessment tool that evaluates offenders across twelve domains including offending history, accommodation, education and employment, relationships, lifestyle and associates, drug and alcohol misuse, emotional well-being, thinking and behaviour, and attitudes. It generates both a risk of reoffending score and a risk of serious harm assessment, and is used to inform sentencing reports, supervision plans, and parole decisions (Howard, 2006).

Durham Constabulary's Harm Assessment Risk Tool (HART) was the first police predictive tool in England and Wales to be subjected to a published independent algorithmic impact assessment. HART was designed to assist custody officers in making bail decisions by classifying detainees as low, moderate, or high risk. A 2017 evaluation found that the tool used postcode of residence as a predictive variable — a factor directly correlated with race and socioeconomic status — raising discrimination concerns. Durham subsequently modified the tool and published its full methodology, a degree of transparency unusual in the sector.[2]

Conclusion. Criminological forecasting is not a passing trend. It reflects a fundamental shift in how governments, law enforcement organisations and courts approach the challenge of managing crime and delivering justice in data-rich environments. For law students and legal professionals, understanding this field is no longer optional: risk assessment reports appear in sentencing hearings, predictive policing practices shape the contexts in which arrests are made,

[1] National Institute of Justice. (2012). Predictive policing. U.S. Department of Justice. https://nij.ojp.gov/topics/law-enforcement/predictive-policing

[2] Oswald, M., Grace, J., Urwin, S., & Barnes, G. C. (2018). Algorithmic risk assessment policing models: Lessons from the Durham HART model and 'Experimental' proportionality. Information & Communications Technology Law, 27(2), 223–250

and algorithmic outputs increasingly mediate the exercise of discretion at every stage of the criminal justice process.

The key insight that emerges from this overview is that forecasting tools are never neutral. Every predictive instrument embeds choices — about which variables matter, which data to use, and which conception of fairness to apply — and those choices have consequences that fall unequally across different populations. A student of law is well positioned to ask the right questions: Has the defendant seen the basis of the risk assessment? Can it be challenged? Has the tool been independently validated? Does it perform equally across racial and gender groups? Is it being used as a guide or as a substitute for judicial judgment?

Used carefully, with appropriate legal safeguards and genuine transparency, criminological forecasting can make justice systems smarter and more efficient. Used carelessly, it can entrench historical inequalities under the authoritative guise of scientific objectivity. The law has a decisive role to play in ensuring the former and preventing the latter.

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