AI-Enabled Policing through CCTNS Data Analysis: A Quantitative Study on smarter FIR Filing and Resource Optimization in India

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ABSTRACT

The policing system in India has to deal with significant workload with limited human and institutional capacity. This paper tires to find how Artificial Intelligence when integrated into Crime and criminal tracking Network and systems can help in strengthening the speed and quality of FIR drafting, or FIR Automation with smoothen routine documentation and data centric decision implementation. The analysis of the study was done by using verified secondary sources that helped in understanding the patterns of investigation, reporting and digital adoption that undermines the debate of India's transition in evidence based-policing technologies that also require Digital Policing Reforms. This paper draws a comparison between domestic developments with international models and tries to identify the gaps where AI can reduce the clerical burden and assist in disposing caseloads. Issues of transparency, privacy protection and responsible accountability that are transformed by the ethical and legal principles are also emphasized in this study. The findings suggest that AI should be introduced gradually and carefully with each AI adoption being evaluated using real data and measurable outcomes eventually transforming the Indian Criminal Justice system.

Keywords: Artificial Intelligence in Policing, CCTNS Integration, FIR Automation, Digital Policing Reform, Predictive Analysis, Resource Allocation, Indian Criminal Justice System

INTRODUCTION

More than five million cognizable cases were reported by the Crime in India Report 2022 (NCRB) that shows the public demand and the growing reliability of digital reporting methods. Even though there are improvements in documentation, the national IPC chargesheeting rate remains modestly above seventy percent, pointing to significant delays which can be because of administrative workloads. The increase in the cybercrimes further complicates the system, highlighting the rise cyber criminals at a time when India's police population ratio, at roughly 152 personnel per 100,000 people. This remains significantly below international benchmarks. The Crime and Criminal Tracking Network and Systems that was introduced in 2009 to lighten clerical burdens by digitizing police records and enabling real-time connectivity, now links nearly the entire police station network. Yet its use in most jurisdictions remains limited to data entry and basic retrieval rather than analytical processing.

Within this context of structural pressure, several Indian states have begun experimenting with Artificial Intelligence tools layered on top of CCTNS, that includes features like automated text-based assistance, pattern-based hotspot mapping, facial comparison modules, and early forms of workflow optimization. These pilots demonstrate that automated triage, assisted drafting, and structured analytical support can reduce the administrative load on officers and improve the consistency of investigation processes, but they remain fragmented, small in scale, and largely unevaluated. This study puts India's digitization efforts within a quantitative framework that draws on verified NCRB, BPR&D, and public administrative datasets to examine crime patterns, chargesheet performance, cybercrime, and resource density across representative states. The goal is to understand where AI can make meaningful contributions to FIR processing and resource optimization while respecting the obligations of constitutional policing. The introduction therefore sets up the central

question guiding the paper: how can AI-augmented workflows, built on CCTNS, strengthen efficiency and accuracy without undermining transparency, accountability, or citizens' rights?

LITERATURE REVIEW

Law enforcement agencies worldwide have begun integrating AI-based analytics to help prevent and solve crime in recent years. For instance, a RAND Corporation study (2013) defined "predictive policing" as the application of statistical techniques to identify likely future crime targets and allocate police resources proactively. Such data-driven approaches are already in practice like Singapore's Home Team Science & Technology Agency (HTX) that developed an AI-powered chatbot (R-COP) to assist the public in lodging police reports more easily. The machine-learning engine in it, prompts users for missing details also corrects input errors. Similarly, the UK's National Data Analytics Solution (NDAS) is a police program that centralizes data from multiple forces and applies algorithms which are advanced to generate actionable crime-prevention insights. Nevertheless, international guidelines stresses that ethics must guide these tools. Principles of human rights protection, human oversight of any AI system, transparency, etc. are highlighted in UNESCO's 2021 Recommendation on the Ethics of AI establish criteria for AI in law enforcement, highlighting the necessity of both strong legislation or regulation to utilize the potential of AI in law enforcement.

Ever Since Cyber Crime in India has doubled from 21,796 in 2017 to 44,546 in 2019, according to NCRB data therefore there was an alarming need for the nuanced techniques for Digital policing that also required Digital Policing reforms. Nevertheless, the Police in India has also started to use AI in policing systems. Most notable Example Is of Delhi Police in the use a System called "AMPLED FIVE" which allows them to check and even sharpen the cctv footage if they are of low quality then directly match them with National database. Predictive analytics is being used to map crime trends and high-risk regions, allowing for more deployment if more proactive personnels in that region., Delhi Police (CMAPS): The Crime Mapping, Analytics and Predictive System (CMAPS), Maharashtra Police (MahaCrimeOS AI), Odisha Police (Project SHIELD) are some of the popular AI integration examples in Indian State Police. Initiatives like the "Vimarsh 2023" hackathon which was a joint effort by the BPR&D and the Department of Telecommunications that further showcased AI-driven innovations including voice-assisted FIR filing to drone surveillance and predictive crime modelling. The Ministry of Law and Justice has also noted that these tools are helpful in making the entire legal system more efficient and accessible to the public. Civil-society reports add social context: the 2023 Status of Policing in India report found generally high public support for surveillance and police-tech measures (albeit with less awareness of privacy issues like the Pegasus case). Overall, the reviewed literature indicates that Indian policing is rapidly embracing AI-based analytics and digital services – through data integration, automated assistance and predictive tools while also drawing on ethical guidelines and training frameworks (as emphasized by BPR&D and international standards) to guide this transformation

Objectives

1. To analyze how AI can improve FIR filing using CCTNS data.
2. To study the role of AI in optimizing police resources in India.
3. To evaluate the effectiveness of AI-enabled policing for faster decision-making.
4. To identify challenges and opportunities in implementing AI in police operations.

METHODOLOGY

This study relies on a quantitative descriptive approach, using verified secondary data to understand patterns in crime reporting, chargesheeting, cyber offences, and police resource capacity between 2020 and 2022. The research follows a cross-sectional descriptive research design based on aggregated national- and state-level data. Since India has not yet implemented large-scale, evaluated AI systems in policing, the study does not attempt to link technology to outcomes causally. Instead, it tries to examine existing crime and workload trends to analyze where AI, if integrated into the Crime and Criminal Tracking Network and Systems (CCTNS), could practically strengthen routine processes like FIR drafting and resource allocation, which may smoothen the

policing system in the long run. Accordingly, the study is exploratory and diagnostic in nature rather than predictive or explanatory.

NCRB's Crime in India 2022 report was used as the primary dataset, which provides standardized national- and state-level figures on cognizable offences, IPC and SLL (Special and Local Laws) patterns, cybercrime, and chargesheet rates. Where relevant, limited trend references from earlier NCRB publications (2020–2021) are used only for contextual comparison, with 2022 remaining the principal year of analysis. To interpret institutional capacity and resource constraints, the analysis uses BPR&D's Data on Police Organizations (2023), including police strength, sanctioned posts, and training indicators.

Uttar Pradesh, Maharashtra, Telangana, Bihar, and Odisha are selected. State selection follows purposive sampling criteria based on population scale, reported crime volume, cybercrime prevalence, and observable variation in administrative capacity. Variables such as crime incidence, crime rate, chargesheet performance, cybercrime prevalence, and police–population ratios were used in their original NCRB definitions, with only minor rounding for clarity in the study.

Analysis of National Overview:

INDIA RECORDED 5,824,946 COGNIZABLE OFFENCES IN 2022**, INCLUDING** 3,561,379 IPC CASES **AND** 2,263,567 SLL CASES **THAT MARKED A** 4.5% DECREASE **COMPARED TO 2021. THE NATIONAL** CRIME RATE STOOD AT 422.2 PER 100,000 POPULATIONS**, SLIGHTLY LOWER THAN THE PREVIOUS YEAR WHEREAS THE IPC CHARGE SHEETING REMAINED MODERATE AT JUST ABOVE** 70%**, WITH CONSIDERABLE VARIATION BETWEEN STATES. CYBERCRIME CONTINUED ITS RISE, REACHING** 65,893 CASES**, MAINTAINING A CONSISTENT UPWARD TREND SINCE 2020. IN THE FOLLOWING TABLE, FIVE SELECTED STATES SHOW NOTICEABLE DIFFERENCES IN CRIME PATTERNS AND POLICING PERFORMANCE:**

State Wise Crime & Performance Indicators

Table 1. Crime and Performance Metrics, 2022

State	Total Crimes	Cognizable Crime Rate (per 100,000)	IPC Chargesheet Rate (%)	Cybercrime Cases (No.)	Sanctioned Police (per 100k)	Actual Police (per 100k)
Uttar Pradesh	786,086	319.9	79.2	8,829	181.75	133.86
Telangana	165,830	436.9	79.7	15,297	218.47	165.88
Maharashtra	557,012	443.0	82.7	5,562	186.36	136.45
Bihar	347,835	277.1	82.5	1,413	115.08	75.16
Odisha	172,167	373.6	77.4	2,037	147.76	122.59

Sources:* -Crime data:** NCRB, *Crime in India 2022.** Bureau of Police Research & Development, *Data on Police Organizations (DoPO),* figures as on 01-01-2022 (per 100,000 population)

Findings from Table Analysis of the States: -

- **Volume of FIRs and their Registration load**: - The highest volume of cognizable offences in 2022 was recorded by Uttar Pradesh and Maharashtra respectively. High crime incidence directly results into a large number of FIRs being registered through the Crime and Criminal Tracking Network and Systems (CCTNS) and each FIR requires drafting, legal section identification, and timely entry.. This creates a significant workload for police stations. One major issue can be of the human error that can be made in the processing ofthose heavy caeloads. Therefore, the findings indicate that AI supported features within CCTNS such as standardized FIR templates and section suggestion can be very helpful and time efficient for handling of cases.
- **Personnel shortage: -** There is uneven staffing of police across the states with gaps in sanctioned and actual strength**.** Noticeable in Bihar's strength with significantly lower than the national average still raising concern on having very high chargesheeting that may indicate hasty disposal or lower investigation quality. In understaffed places, routine work and documentation places extra pressure on police, who has to perform investigative work as well. This suggests that AI support tools are needed to help manage workloads with limited human resources.
- **Cybercrime FIRs and Documentation Complexity**: - The table further highlights a concentration of cybercrime FIRs in certain states, with Telangana reporting 15,297 cases and Uttar Pradesh reporting 8,829 cases in 2022 which is also an increase from the previous year showing a rising trend in cyber offences but unlike conventional FIRs, cybercrime complaints often involve different dimensions like technical terminology, cross-jurisdictional elements and even multiple accused persons. These factors increase the complexity and revision frequency of FIR documentation within CCTNS. Therefore, the AI assisted features can help in better turnout of the cases and speedy disposals hence keeping up with the technology and its related crime volumes.

Comparative Insights: India and International AI-Enabled Policing

The world is utilizing AI from education to entertainment but its ability is best use when it is done for the welfare of the people. Policing at International level is no stranger to it, starting with Singapore where its's Home Team Science and Technology Agency (HTX) have shown the most integrated use of AI into daily policing. Automated report-writing assistants, AI Based video analytics, AI in cybersecurity, AI in Forensics and patrol-planning systems are not experimental but a part of routine operations. HTX is a centralized model with unified standards and platforms whereas India's police technology is fragmented across multiple bodies such as NCRB, BPRD, SCRB etc. Also while CCTNS provides nationwide digital coverage, Indian police rarely use AI for structured documentation or workflow support. Singapore demonstrates what becomes possible when AI is directly integrated into reporting processes. The United Kingdom's National Data Analytics Solution (NDAS) was built for deploying AI and Machine learning across the policing system of UK. It takes a different approach, focusing on analytics of Predictive Policing that operates under strict ethical guidelines. ALGO-CARE (Advisory, Lawful, Granular, Ownership, Challengeable, Accurate, Responsible, Explainable) is one of the framework of NDAS that self-regulates AI development handling the risk of biased algorithms. Their model emphasizes the importance of clear governance structures with Data (use and Access) Act 2025 which was a major reform in modernizing the UK's Data protection and e-privacy framework. India's current environment relies heavily on administrative guidelines and lacks specific AI governance for policing, even though the Digital Personal Data Protection Act provides a legal basis. NDAS shows that large-scale AI implementation requires equally robust oversight.

The United States has Programs like RAND's predictive policing with Predictive crime, offenders, victims as well as predicting perpetrators' identities. Even though this program showed measurable gains in deployment efficiency, but at the same time studies highlighted risks related to biased datasets and community trust which presents a mixed picture. The key lesson for India here is caution or in easy words AI cannot be deployed without data quality to ensure non biasedness in predictive policing and clear rules for review.

Overall, across all three countries, two things are clear. AI helps humans rather than replacing them, and it works only when the fed data is authentic and well maintained.

POLICY RECOMMENDATIONS

The Ministry of Home Affairs should establish a unified national level agency like HTX that consists of all policing technology functions like AI in Cybercrime, forensics, research, data analytics etc. and this unit should also be responsible for ensuring compliance with the Digital Personal Data Protection Act 2023, maintaining standards of transparency. AI systems must be designed around human oversight: officers should be able to verify, modify, and also reject automated suggestions. Clear audit mechanisms, regular public disclosures, and third-party reviews periodically will be essential to building trust and credibility.

Improving the quality of CCTNS data by training and setting SOPs for digital entry and regular data quality checks should be a priority. Since AI system is as helpful as the data fed to them therefore data cannot be compromised. For efficient integration of AI into policing a smart and steady approach needed to be taken. training of personnel in matter of technical and legal implication of having automated support system should be taken. These digital training is necessary for smooth utilization and integration into Policing. As mentioned before as well, Initial AI deployments should be concentrated in states with strong digital ecosystems such as Telangana and Maharashtra because these, controlled pilots can measure changes in FIR processing times, resource utilization and efficiency of case-flow which will help in evaluation an assessment of AI.

To guide this transformation, hence it may help in ensuring that final responsibility remains with accountable human decision-makers. With proper implementation of these recommendation and new innovations India can transit from basic digitalization to a more advanced data and technology driven policing.

DISCUSSION

Despite the potential demonstrated by AI analysis of CCTNS Data, some basic structural issues like digital advancement or hardware and software support with infrastructure and training remains a challenge for many police station. Hence there is a need for technology adoption with investment in data standardization and training or it may again lead to uneven outcomes. This study is also subject to certain limitations as it relies on secondary data and comparative state-level indicators than the actual real time AI deployment of policing environment. The lack of detailed state level data makes it difficult to conduct more in-depth analysis. Moreover, the social and ethical impacts of AI-assisted policing were examined at a conceptual level than through empirical assessment of stakeholders. Future researches may fill this gap by conducting long term and district level research like AI assisted FIR processing in actual policing setting and assessment of algorithm fairness which can help integrating CCTNS analytics with other criminal justice datasets.

CONCLUSION

Even though the CCTNS have made record keeping more standard, a large portion of time and work is consumed by manual documentation and repetitive administrative work. These inefficiencies caused by this leads to the delay of millions of cases per year. The study suggests that when AI technology is integrated into current CCTNS framework, it can help in enhancing the efficiency in multifaceted ways. With proper training Officers can process cases more quickly and accurately by using features of Data driven deployment models, automated drafting supports and automated text analysis module. When implemented with strong ethics of transparency, auditability as well as data security protections, these AI tools can be a very useful as a support rather than replacement of human judgement in the policing. This is also observed by the international examples so far.

The gradual and well evaluated path is best for India wherein the states with greater digital accessibility can serve as a testing ground for AI integration in policing as they have the capability to measure the real improvements in FIR Processing time and Quality and also overall abbreviation of workload. Meanwhile to ensure public trust and prevention of misuse ethical rule and clear operational boundaries should be maintained strictly. Lastly, AI may not solve every structural limitation but it can empower the nationwide system of digitalization which in turn will help the Indian Criminal Justice system and Policing to create a more robust and responsible policing system.

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