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A Review on Resolving Crime with Prediction

Dhina Yadav[1], Kewal Krishan[2]
[1]*Research Scholar,* [2]*Assistant Professor, Dept. of Computer Science & Engineering, Lovely Professional University, Punjab*

Abstract: ***Crime data analysts can assist law enforcement officers in accelerating the crime prediction process with the rising advent of computerized systems. This survey paper, therefore, presents a description of the tools and strategies used in the study and forecast of crime data. Crime forecasts are a way to exploit and reduce future crime by anticipating when future crime will happen. Crime prediction relates historical data and predicts the next crime, based on place, time, day, season, and year after analyzing data.This paper provides a fair review of numerous discoveries and predictions of potential crime***
Keyword: Crime forecasting, Sequence generation, Spatio-temporal analysis, K-mean , regression , Random Forest, SmoteR

I. INTRODUCTION

In general terms, a crime is an act or omission that is socially damaging and violates state/Country-protected principles. It is an incident forbidden by rule, and can be accompanied by an arrest in criminal proceedings and, consequently, imprisonment on conviction. Thanks to decades of academic research, criminality has become the most important multidisciplinary approach to modern ways of handling crime and terrorism. Crime scientists typically use a wide range of various disciplines and sciences, rather than typical criminologists, to achieve their goal of reducing crime. Crime research has been able to provide innovative ideas for the more complex problems that concern the health and safety of millions of people, using expertise from chemistry, geography, econometrics, physics, statistics, psychology, applied mathematics, and engineering. Statistics and machine learning are perhaps the most commonly used methods for crime scientists of all areas and disciplines used. Let's talk about crime now. Every crime has two main elements: action, "actus reus," and intent or "mens rea." The crime of brass, for example, has two parts: fire in a building and doing it intentionally and knowingly. Fire can't be a crime by mistake. The actus reus and mens rea must be proved in most criminal cases. There have been no crimes if any aspect is missing. Let us switch to the criminal law principle to better understand these elements.

A. Criminal Law Principles

"Innocence presumption" is a criminal justice system principle. The accused is supposed to be innocent until the guilty has been demonstrated. "Burden of proof" means that the Prosecuting Attorney has to prove the culprit. There is no need for the defence counsel to prove the defendant is innocent. The word "beyond reasonable doubt" applies to the probability of a crime committed by the defendant. The Crown must show that the accused is guilty and that the judge or jury can not have any fair doubts. If a fair doubt remains, the accused should be found not guilty. let's Concentrate on seven principles of crime

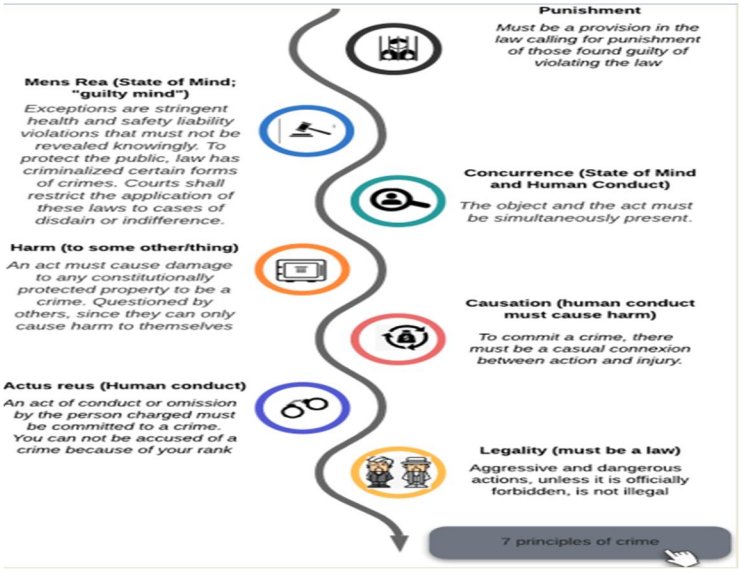

Figure 1 : Seven Principles of Crime

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It is crucial that we take advantage of criminal ideals in order to make our society a more prosperous place to live, and we must be fully aware of our rights. So let's focus on the basic 18 Laws and Rights, every Indian need to know.

FIGURE 2 : 18 Laws and Rights

1) *Motor Vehicle Act 1988, section -185, 202:* If you have more than 30 mg of alcohol in your 100 ml blood, you will then be arrested without a warrant by police.
2) *Criminal Procedure Code, Section 46:* Around 6 a.m. to 6 p.m. a Woman can be arrested.
3) *Indian Penal Code, 166 A:* If a police officer refuses to lodge an FIR, they can be held up to 6 months to 1 year in prison.
4) *Indian Sarais Act, 1887:* Not just simple hotels but the 5-star hotel couldn't discourage you from drinking water and using its restrooms.
5) *Motor Vehicle Act, 1988:* According to Section 129 of the Act, it's a must for two-wheeler drivers to wear a helmet. Under section 128 of this Act, a maximum of two drivers is limited to motorcycles.
6) *Domestic Violence Act, 2005:* If a young boy and a young girl are interested in living together, they will because it's not illegal. Even the newborn is also a lawful son or child, and the newborn is entitled to his / her father's properties.
7) *Police Act, 1861:* Whether or not a policeman wears a uniform is still at duty. If a person lodges a complaint with the police, the police can not inform the victim that they can not help because they are not in service.
8) *Maternity Benefit Act, 1961:* No co-organization may fire a pregnant woman. If so, they could be sentenced up to three years in prison.
9) *Income Tax Act, 1961:* In the event of a tax breach, you may be detained by the tax collection officer, but you will have to be informed of it before you are detained. Just the tax officer decides how much longer you are in detention.
10) *Hindu Marriage Act, Section -13:* In accordance with the Hindu Marriage Act, in 1955 (any married couple) can petition for divorce in a court on the grounds of adultery (Physical relationship beyond wedlock), mental and physical violence, impotence, deprivation, change of Hindu religion and other religion, insanity, incurable disease and no husband or wife details for a period of seven years.
11) *Code of Criminal Procedure, 1973:* Only female police officers are going to prosecute women . And women can deny going in prison between 6 pm to 6 am

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B. As per the Citizen Charter (Indian Oil Corporation website)

Very few people know that the gas agency will pay Rs. 50 lakh to the victim in compensation if the gas cylinder explodes during food cooking.

1) *Automotive (Amendment) Bill, 2016,:* You will not be charged in the same situation on the same day if you are convicted for a crime (such as riding without a helmet or for some other reason).
2) *Maximum Retail Price Act, 2014:* Every storekeeper doesn't have the right to charge more than any impressed product, but the buyer is entitled to demand less than the impressed price of a good.
3) *Limitation Act, 1963:* You have the right, in 3 years, to file an FIR against your office, if they do not pay. However, you won't get anything for it after 3 years.
4) *Section 294 of the Indian Penal Code:* You may be held for a period of three months in jail without a specific description of "obscene behavior" in local public areas, although the police misused this act before.
5) *Hindu Adoption and Maintenance Act, 1956:* Anyone belonging to Hindu faith and having a son or grandson can not adopt a second child. There should be a gap of 21 years between you and your adopted son
6) *Delhi Rent Control Act, 1958, Section 14:* You will not be permitted to leave your house forcibly if you reside in Delhi without prior notice.

C. Punishments & Its Purpose

It must be the goal of law to preserve society and to root out criminal tenderness, to be accomplished by enforcing a suitable judgment. Law should also address the challenges facing society as the cornerstone of the building of order. The sentencing authority must be able to determine and analyze the appropriate and effective circumstances surrounding the offense. The purpose of the criminal justice system is not only to deter crime but also to take into account the resources available to the criminal authorities and forms the perpetrator will be rehabilitated. Criminal damage is a hard change of deprivation of rights purposely forced.

Figure 3 : Punishments and its purpose.

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D. Crime Rate

The crime rate in our Indian economy is rapidly growing. Unpunished criminals are responsible for the offenses. The crime epidemic was an unrelenting danger to society. The crime remains a nightmare to the government of the day from a small threat to robbery with violence. The rise in the crime rate in many countries is modest and testifies to the countless problems facing society. The need to solve the majority of these problems prompted many policymakers to search for solutions for a course they do not understand the causes of. The higher crime rate discourages people from building up their properties, thus slowing down economic activity and failing to support growth. Unemployment is also a major cause of India's rising violence. Because of the unemployment rate, the population continues to commit crimes to achieve the ends. The crimes also emerge from injustice and organized crime. Crime rates and inequalities within countries and particularly among countries are positively correlated and this correlation reflects the cause of inequality to crime even after other crime determinants have been checked.

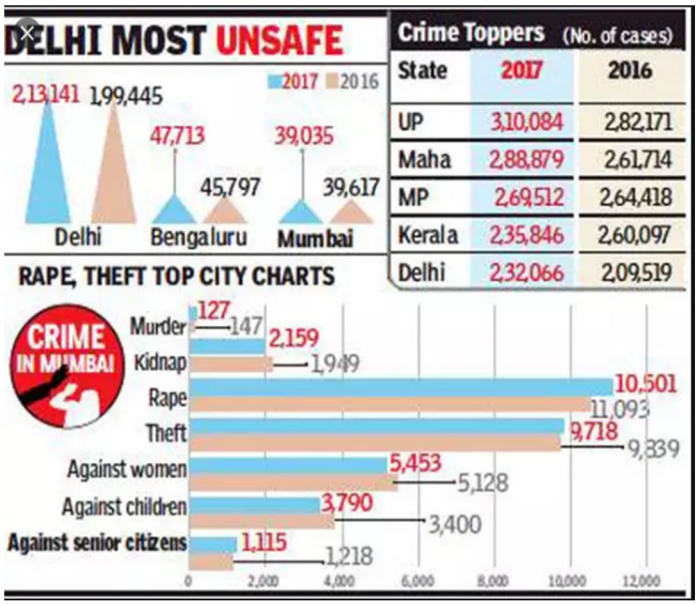

Figure 4 : Rapid increase in crime rate[1]

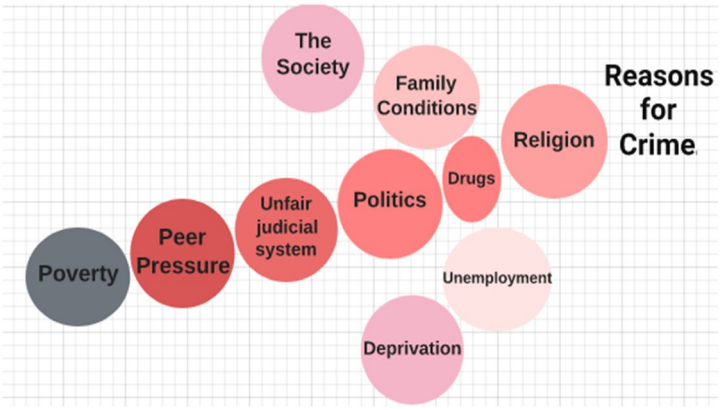

Figure 4: Reasons for Crime

E. Need for Prediction System

We can now derive from the principle of machine learning in R. A Secret, valuable, unstructured data information. Here we have a computer science and criminal justice approach to designing a software training system that can help solve crimes more efficiently. Rather than concentrating on causes of crime like a crime of the delinquent, political enmity, etc., we concentrate on everyday crime factors. So a crime analysis and prevention to identify and investigate the trends and causes of crime, a holistic approach is important. A framework in which regions highly vulnerable to crime can be predicted. Crime data analysts can support law enforcement authorities in the introduction of computerized programs to enhance the crime resolution process.

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II. LITERATURE REVIEW

John C. Meyer, Jr. :These forensic notes demonstrate an approach to crime analyses within policing jurisdictions. Association analysis seems to be a useful way not only for classifying criminal areas but also for identifying crime trends in those sectors. This method is discussed briefly and is an example of demonstrating its use. In this paper also discussed some other methods and application areas . This paper covers a promising method found in the work of mathematical taxonomists who have
developed algorithms to identify geographical areas based on different 'population' in the territory studied. Obviously, crime statistics are "populations" of crime and can be classified as normal in F.B.I. reports or internal audits. Consequently, it would be tragic if these approaches were not adequately discussed in addressing the issue facing policy managers and administrators.[2]

Corcoran, Jonathan Wilson, Ian D. Lewis, Owen M. Ware, J. Andrew : The paper uses the GIS-Coupling with Artificial Neural Networks (ANN) to establish hidden relations and patterns in such diverse datasets. Therefore, this paper explains the first steps of a framework for the prediction of crime hot spots. A set of Kohonen Self Organizing Maps (KSOM) are used to group the data so that common characteristics can be extracted. So this paper describes a possibly expandable method for modeling and forecasting a broader range of crimes based on a wider combination of criminal, contextual data, and a standard crime prediction scheme.[3]

Giles C. Oatley[a,*], Brian W. Ewart[b] :This paper offers a model to explain burglary occurrences. There are a variety of ways in which the model can explain the data observed and forecast future data. This involves comparisons of the relevant functions of the observed data with their corresponding predictive distributions. As significant device outputs include predictive re-victimization probabilities, these predictive probabilities will be compared to observed data events. This will aid the evaluation and detection of any obvious trends of difference in the calibration of predictive probabilities with observed rates. The system's efficiency is also tested against the current 'hot spot' and crime-related risk models.[4]

Jonathan J. Corcoran, Ian D. Wilson, J. Andrew Ware* :Traditional policy frontiers – neighborhoods, patrol districts, etc. – often fail to represent the genuine distribution of crime and thus contribute little to the optimum allocation of police
resources. This paper presents methods for predicting crime by focusing on areas of concern that transcend conventional police frontiers. The computerized approach uses an algorithm for searching geographical crime for clusters with a relatively high crime level (hot spots). These clusters provide ample data to model the trends in artificial neuronal networks (ANNs). A recent and notable approach, the gamma test (GT), is used to develop the approach to ANN requirements and estimates. We can therefore conclude that this paper provides a forecast framework that focuses on areas of interest that may well exceed the conventional boundaries of police. The paper concentrates on the development of a functional approach for operational policy implementations, which strengthens rigid boundary deficiencies and progresses towards a more complex methodology. The computerized method uses a scanning incidence algorithm for geographical crime to identify clusters with relatively high levels of crime (hot spots).[5]

Hua Liu[a], Donald E. Brown*[,b] :This paper provides a multivariate forecast for the hot spots relating to the expected crime occurrence in a given area via the preferred configuration of the criminals. For predictive space-time incidents, they have a point pattern dependent transition density model based on the discovery of criminal preferences as seen in past crimes. The resulting model outperforms current procedures, as statistically seen by an application for accidents at Richmond, VA. So this article therefore essentially explains the newly established space-time prediction model for crime scenarios and tests it on breaking and entry of burglary scene details from Richmond, VA.[6]

Sheng-Tun Li[a,b,*], Shu-Ching Kuo[b,c], Fu-Ching Tsai[a,d] : This paper proposes to classify and analyze the patterns of crime trends from temporal crime activity data a system for intelligent decision support based on a fuzzy self-organizing map (FSOM). To discover causal-effect information and expose its impact change, a rule extraction algorithm is used. Unlike most of the present studies on crime, they are targeting a real non-Western scenario, namely Taiwan's National Police Agency (NPA). This model will allow police administrators to determine more effective policy-making measures and to optimize the deployment of police duties to deter crime. So in turn this paper applies information discovery technology in the public safety index to help language data decision-making for preparing the implementation of policing tasks. The neural system Fsom is employed to uncover crime trends from crime volume data generated in Taiwan by the NPA during the period of information discovery. Then use the time series temporal linguistic rule discovery and J measure to classify the districts with prominent crime and to assess the relative magnitude of crime in each district with a critical value.[7]

Dawei Wang[a] , Wei Ding[a,*] , Henry Lo[a] , Melissa Morabito[b] , Ping Chen[e], Josue Salazar[c] , Tomasz Stepinski[d] : In this research, they implement a framework for spatial data mining to research crime hotspots through their associated variables. We use the GDP to monitor a large difference between the two groups in a geo-spatial dataset (hotspots and normal areas). They are designing a new model using GDPatterns, the Hotspot Optimization Tool (HOT), to help classify the crime hazards.

Finally, they group GDPattern classifications and vision the distribution and characteristics of crime-related variables based on a similarity scale. They test the method with a real-world dataset from an American town in the north-east.[8]

George Mohler : In this paper, we explain how punctuating crime patterns can be expanded to include major crime forms by taking a strong point approach to both short- and long-term patterns of risk. Different years of data and various forms of crime are routinely combined to provide precise maps for gun crime predictive police.

The approach is applied to a broad open-source data collection that the Police Department of Chicago has made available to the general public online. This paper shows how to improve existing methods through the combination of short and long-term estimates of kernel density.

They have presented a well-known point process model consisting of multiple types of crime and several years of crime data in crime hotspot maps. The model can be effectively calculated using an EM algorithm and can therefore be conveniently implemented on a desktop or as a cloud-based application linked to an RMS police department.[9]

Yu, Chung Hsien Ding, Wei Chen, Ping Morabito, Melissa : This paper provides a new feature design and a crime prediction selection system. In various periods of time at different granularities, a new definition of the multi-dimensional function, referred to as spatiotemporal pattern, is developed from local criminal distribution clusters. To effectively select the required local Spatio-temporal patterns to create a global crime pattern through a training collection, they design and build a Cluster-Confidence-Rate Boosting (CCRBoost).

This trend of global crime is then used for the prediction of potential crime. They test the proposed structure on residential burglary forecast using data from the police department in the US from January 2006 to December 2009. The results show that approximately 80% of prediction accuracy of residential burglaries using the 800-meter grid cell by 800-meter is achieved by the proposed CCRBoost algorithms at a single spot.[10]

Bruno Cavadas[1,2], Paula Branco[3,4] , and S´ergio Pereira[5] : In this text, they proposed a pipeline to forecast violent crime and an optimization framework for capital. The prediction includes feature selection through correlation and the study of functionality, sampling, and regression of unusual extreme values of the target variable. RF demonstrated the best performance among the tested learning systems. The pipeline itself is one of the contributions of this work, as this data set has never been treated as a regression to the best of authors ' knowledge.

With the forecasts behind this, they suggest a policy support framework to optimize police officers around the country, taking into account projections of violent crime, population, density, and state budgets. This paper is described as a proof of concept since certain parameters have been synthesized and do not match the actual scenario. However, their findings show that the burden of crime in countries of the South of the US is higher compared to the countries of the North. That is why southern states appear to have a higher police assignment.

These predictions are consistent with some national studies, and while certain optimization parameters are not entirely practical, they seem to function as planned.[11]

Anneleen Rummens, Wim Hardyns*, Lieven Pauwels : The purpose of this thesis is to explore the capacity of predictive analysis in an urban climate. In order this to obtain the results, the available criminal records are spatially combined to grids of 200 by 200 meters and retrospectively analyzed for three crime category (house burglary, street robbery, or battery). An ensemble model is used to synthesize logistical regression results and neural network models, resulting in two weekly forecasts from the previous three years for 2014 based on crime data. Monthly projections are also made temporarily disaggregate (day vs night forecasts). The standard of the forecasts is assessed based on the following criteria:(proportion of correctly forecast incidents), precision (proportion of correct forecast vs. overall forecast number) and prediction index (proportion of direct hit rate vs. high-risk overall area expected proportion).[12]

Yujie Hua[a] , Fahui Wang[b], Cecile Guin[c] , Haojie Zhu[b] : This paper proposes a predictive hotspot mapping and evaluation Spatio-temporal system. The proposed framework has four key features compared to the current tasks in this area: (1) a Spatio-temporal kernel density estimation (STKDE) method is employed to include the time dimension in predictive hotspot mapping, (2) a data-driven optimization technique, the probability cross-validation, which is used for the selection of the most suitable bandwidths. (3) a statistical sense test shall be built for the filtering in density estimates of false positives and (4) A new metric, the PAI(Predictive accuracy index) is suggested for the assessment of prediction points in different areal scales.[13]

Hitesh Kumar Reddy ToppiReddy[a,*], Bhavna Saini[a], Ginik Mahajan[a] : Different visualization approaches and machine learning algorithms for predicting the distribution of crime are adopted in this report. The first stage involved processing and presenting raw datasets according to the requirement.

Then, machine learning algorithms were used to extract information from these broad data sets and to discover the secret relationships between the data used for reporting and finding the criminal trends that are essential to crime analysts to analyze those networks of criminals through interactive visualization for crime prevention.[14]

Varvara Ingilevich[a], Sergey Ivanov[b] : The primary objective of the research was to determine whether the number of crimes in a given urban area can be predicted using various statistical tools. In the process of implementing the predictive model, the clustering technique was used to determine the spatial patterns of crime and to detect factors affecting criminal activities. The selection method for functions was also used to select the most important considerations and to prevent future models from overfitting.

The crime rate was predicted by three kinds of models. During the study, they showed some drawbacks of the models such as the forecast of negative values made by the model of linear regression. The gradient boosting model achieved the best accuracy. The research results can help the police find the best locations for the police station in the city and identify strategies for reducing the crime rate.[15]

Deepika K.K [1,*], Smitha Vinod[2] : This paper suggests a strategy for the identification of crime in India using data mining methods. The method consists of Pre-processing, clustering, classification and visualization of the data. Criminology also uses data mining methods because it yields good results.

Criminology is an area where different features of crime are studied. Analysis of data on crime means the discovery of data on crime. Crime is detected by clustering with k-means and the clusters are generated by similarities between criminal attributes. The Random Forest and Neural algorithms are used to classify the data. Google's marker clustering is used for visualization, and crimes are labeled on the India map. The exactness is verified by the WEKA method. The Crime Department of India will benefit from this approach to help predict crime. The paper focuses on crime analysis between 2001 and 2012 in different Indian and the Union States.[16]

Charlie Catlett[a,b], Eugenio Cesario[c,d,*], Domenico Talia[e], Andrea Vinci[d] : This document provides a prediction-based approach to identify high-risk criminality regions in urban areas automatically and accurately forecast patterns in each field, based on spatial analysis and automated model regressive.

The algorithm result is a model for the projection of spatial-temporal crime consisting of a set of crime-dense areas with associated crime predictors, each of which is a predictive model for estimating the number of crimes in their associated field. Two real-life datasets in the cities of Chicago and New York were used to conduct the experimental assessment. This assessment shows that in spatial and temporal crime forecasts, the method suggested is good in terms of roll time.[17]

Gaurav Hajela[a],_, Dr. Meenu Chawla[a], Dr. Akhtar Rasool[a] : In this paper, a technique based on machine learning, together with two-dimensional Hotspot analysis, for predicting spatiotemporal crime is proposed. Clustering is used to conduct 2-dimensional Hotspot analysis. p When using state-of-the-art classification techniques, without hotspot analysis and with hotspot analyses, the model with hotspot analysis provides a better result [18]

Shraddha Ramdas Bandekar[1], C. Vijayalakshmi[2*] :

This study depends mainly on providing a forecast of the crime type based on the position of the crime. The creation of a model was made possible by the use of a training data set which was used to clean and transform data.

With the aid of data visualization, the study of the data set and its characteristics can be performed. Different variables are identified and described.

Risk factors are established and predictive interventions that help to safeguard society are created. Different classification algorithms, optimization algorithms, and statistical analyses were carried out.[19]

Mami Kajita[a,b,*] , Seiji Kajita[a] : They created an algorithm foreseeing potential crimes by learning from the past data about the Green function and incorporating the base of the SEPP model.

To forecast one day and one week before the 10 forms of crime in Chicago, a structural comparison is made with the traditional methods EM and PHM.

The results show that DDGF has a strong prediction accuracy that exceeds the standard methods or compares them. Besides, a long-standing, logarithmic correlation of crimes has been given by the DDGF process, in line with the previous burglary analysis. The other methods can not replicate this long-tail function. In other words, the DDGF approach helps one to mine the buried causal effects of crime.[20]

TABLE 1 : Conclusion Table

YEAR	1979	2001	2003	2003	2003	2010	2013
Country/ State dataset	New England city	Cardiff (UK)	UK	-	Richmond, VA	Taiwan,	Northeast city in the United States
Journal	Southern Journal of Criminal Justice	Lecture Notes in Computer Science book series	Expert Systems with Applications	International Journal of Forecasting	International Journal of Forecasting	Expert Systems with Applications	Computers, Environment and Urban Systems
Authors	John C. Meyer, Jr.	Corcoran, Jonathan Wilson, Ian D. Lewis, Owen M. Ware, J. Andrew	Giles C. Oatleya, Brian W. Ewartb	Jonathan J. Corcoran, Ian D. Wilson, J. Andrew Ware	Hua Liu, Donald E. Brown	Sheng-Tun Li, Shu-Ching Kuo, Fu-Ching Tsai	Dawei Wang, Wei Ding , Henry Lo , Melissa Morabito, Ping Chen, Josue Salazar , Tomasz Stepinski
Title	A note concerning the use of classificatory techniques by police for analyzing crime areas	Data Clustering and Rule Abduction to Facilitate Crime Hot Spot Prediction	Crimes analysis software: 'Pins in maps', clustering and Bayes net prediction	Predicting the geo-temporal variations of crime and disorder	Criminal incident prediction using a point-pattern-based density model	An intelligent decision-support model using FSOM and rule extraction for crime prevention	Understanding the spatial distribution of crime based on its related variables using geospatial discriminative patterns
Algorithm	Association Analysis classification tree	Coupling Geographical Information Systems(GIS) and Artificial NeuralNetworks (ANN)	Bayesian approach	Geographic information system; Artificial neural networks	point-pattern-based transition density model	decision-support model based on a fuzzy self-organizing map	Geospatial Discriminative Patterns
Crimes type	heterogeneus crime	heterogeneous crime	burglary	violence against the person, criminal damage, and disorder	‘‘breaking and entering’’ (B&E) incidents	intimidation,drugs, automobile theft, sexual offences, anti-social behavior, theft, motorcycle theft, firearms crime, damage, force taking, fraud, robbery,gambling, and injury	home burglary, street robbery, and battery

YEAR	2014	2015	2017	2018	2018	2018	2018
Country/ State dataset	(northeasten city)US	United States	Amsterdam Netherlands	Baton Rouge, Louisiana	U.K.	(Saint-Petersburg.) Russia	India and the Union States
Journal	Lecture Notes in Computer Science	Lecture Notes in Computer Science	Applied Geography	Applied Geography	Procedia Computer Science	Procedia Computer Science	International Journal of Engineering & Technology
Authors	Yu, Chung Hsien Ding, Wei Chen, Ping Morabito, Melissa	Bruno Cavadas, Paula Branco , and S´ergio Pereira	Anneleen Rummens, Wim Hardyns, Lieven Pauwels	Yujie Hua , Fahui Wang, Cecile Guin , Haojie Zhu	Hitesh Kumar Reddy ToppiReddy, Bhavna Saini, Ginik Mahajan	Varvara Ingilevich, Sergey Ivanov	Deepika K.K , Smitha Vinod
Title	Crime forecasting using spatio-temporal pattern with ensemble learning	Crime prediction using regression and resources optimization	The use of predictive analysis in spatiotemporal crime forecasting: Building and testing a model in an urban context	A spatio-temporal kernel density estimation framework for predictive crime hotspot mapping and evaluation	Crime Prediction & Monitoring Framework Based on Spatial Analysis	Crime rate prediction in the urban environment using social factors	Crime analysis in India using data mining techniques
Algorithm	Cluster-Confidence-Rate-Boosting	Integer Linear Programming formulation, Random Forest, SmoteR	logistic regression and neural network model	spatio-temporal kernel density estimation, cross-validation	K-Nearest Neighbour, Naïve Bayes,	linear regression, logistic regression ,gradient boosting	k-means, Random Forest ,Neural algorithms
Crimes type	residential burglary	Violent crime(rape, murder, robbery, aggravated assault, and non-negligent manslaughter)	home burglary, street robbery, and battery	residential burglaries	heterogeneous crime	banditry , massacre , robbery	heterogeneous crime

YEAR	2019	2020	2020	2020			
Country/ State dataset	(Chicago and New York) U.S	(San Francisco) California	India	(Chicago) U.S			
Journal	Pervasive and Mobile Computing	Procedia Computer Science	Procedia Computer Science	International Journal of Forecasting			
Authors	Charlie Catlett , Eugenio Cesario , Domenico Talia , Andrea Vinci	Gaurav Hajela, Dr. Meenu Chawla, Dr. Akhtar Rasool	Shraddha Ramdas Bandekar[1], C. Vijayalakshmi[2]*	Mami Kajita , Seiji Kajita			
Title	Spatio-temporal crime predictions in smart cities: A data-driven approach and experiments	A Clustering Based Hotspot Identification Approach for Crime Prediction	Design and Analysis of Machine Learning Algorithms for the reduction of crime rates in India	Crime prediction by data-driven Green's function method			
Algorithm	spatial analysis and auto-regressive models	KMeans algorithm	K- Means Clustering, Density Based Clustering	Green’s function , SEPP model.			
Crimes type	-	heterogeneos crime	Murder	Theft, Battery, damage , Narcotics , other offense, Assault , Burglary ,Motor-vehicle theft ,Deceptive practice , Robbery			

III. CONCLUSION

Crime is a significant concern that both society and the environment should undertake and monitor. Crime affects a vast number of individuals, social regions, and the planet. It is very important but difficult to predict and locate appropriate data from vast volumes of crime data. If the advanced problem prediction can be resolved, then the crime can be prevented. If not stopped, it can be cut back. There is a great deal of work in this field. However, there is still some effort to strengthen the forecasting method. Therefore, this survey paper offers an overview of the methods and techniques for improving crime prediction using an efficient collection of data, analysis, and visualization.

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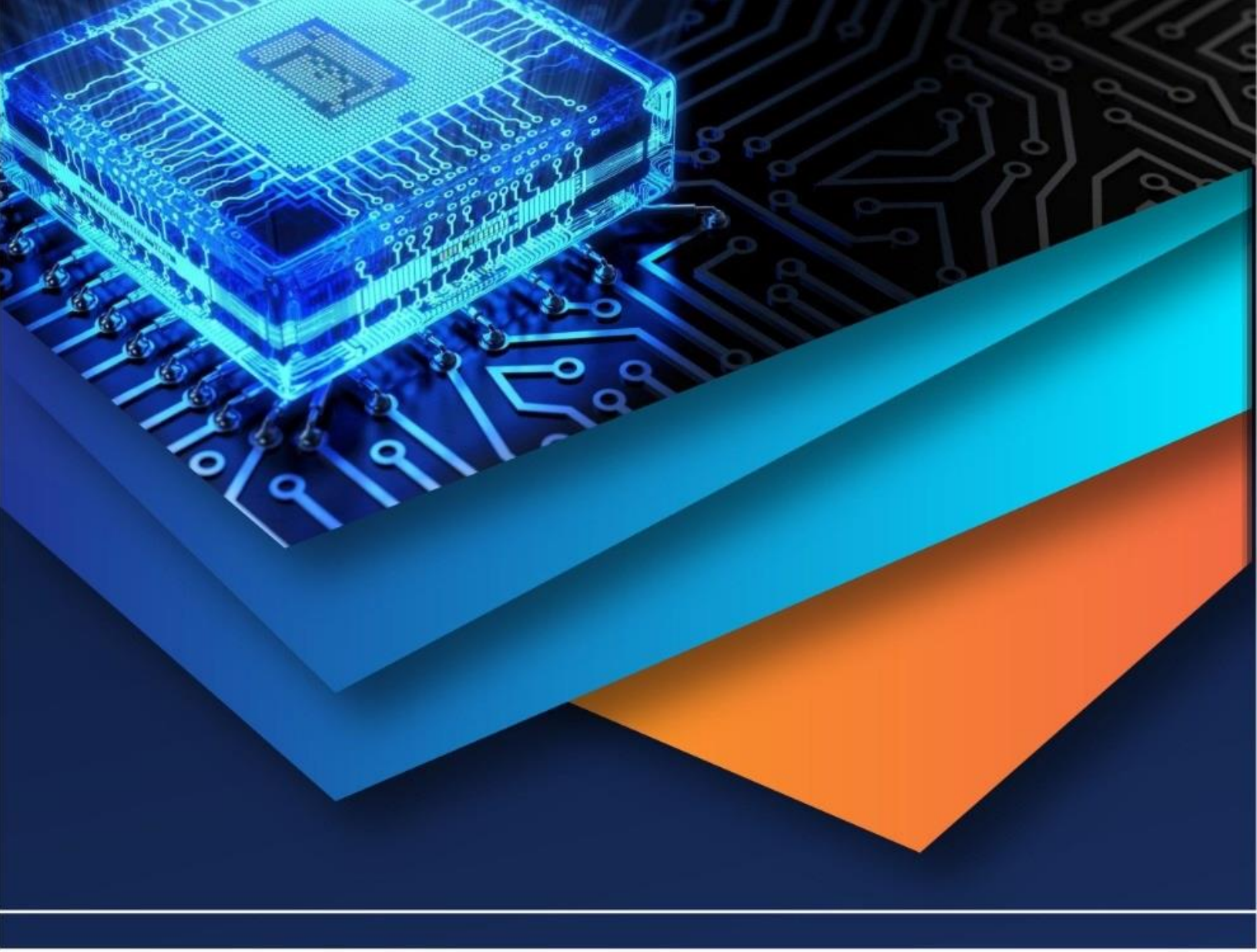

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