Crime Prediction Analysis: A Review

Ms. Prabhjot Kaur, Ms. Kirti Joshi

Abstract - **The data mining is the approach which is applied to extract useful information from the rough data. The classification is the approach of data which is used to classify input data. The prediction analysis is the technique which is used to predict future instances from the current data. The crime prediction is the approach which is applied to predict crime in different cities. In this review paper, various approaches of the prediction analysis is analyzed and reviewed in terms of certain parameters**

Keywords:- **Crime Prediction, Naïve Bayes, Neural Networks.**

I. INTRODUCTION

Data mining is the process in which all the necessary and useful information is extracted for the analysis of data. Various types of data mining tools are present in the data mining that are used for the analysis of different types of data. Some of the applications that use data mining in order to analyze the collected information such as decision making, market basket analysis, production control, customer retention, scientific discovers and education systems [1]. There are some databases in the data mining such as multimedia, object relational, relational and data ware houses studied in detailed. The large amount of collected data became a devastating process of extraction as it is not easy to handle such huge amount of data. In order to minimize these issues two techniques has been utilized such as database management system (DBMS) and structured databases. The database management system plays an effective role whenever it is required to retrieve the particular information from large amount of data. With the help of the above mentioned technique, it becomes easier to collect large amount of information [2]. Data mining act as a powerful tool by which present information is reduced in their data warehouses for most of the companies. Also, in order to discover new information through historical data, the automated analysis has been utilized. This technique is also used in order to detach software from data mining tools. From the earlier times there has been an evolvement of various data mining technique which are still in use as they provide reliable and trustworthy results. There has been an involvement of wide range of applications in the growth of data mining techniques. There has been an identification of several issues which have arisen in the systems of data mining.

Prabhjot Kaur, *M.Tech Scholar, Department of CSE, RIMT Univeristy, Mandi Gobindgarh (Punjab).*
Kirti Joshi, *Asst. Professor, Department of CSE, RIMT Univeristy, Mandi Gobindgarh (Punjab).*

Prediction analysis is the analysis in which future trends and outcomes are predicted on the basis of assumption. Machine learning techniques and regression techniques are the two approaches have been utilized in order to conduct predictive analytics. In the conducting predictive analytics, machine learning techniques are widely utilized and become popular as large scale datasets handled by it is effective manner and provide high performance [13]. It provides the results with uniform characteristics and noisy data. In the several domains, innovative predictive models have been implemented for the betterment of old results which provide results which are justified and better. In the society, crime is the part which needs to be recovered since laws were first approved. It is the act in which all the rules abided by the law are forbidden or omitted by the criminals for which, punishments are imposed which is a long process [4]. It is not easy to predict crimes. It is the act in which criminal offense the law and made a miss happening that affects the stable life of society. Data mining techniques has been utilized for analysis, observation and the analysis of behavior as it assists. Therefore, it is the process in which hiding patterns are uncovered, new patterns are discovered from large data sets in which statistics and artificial intelligence methods are involved but also database management. All the results from social, economical and environmental factors are integrated which result in crime also called as behavior disorder. There are several ways by which society is affected and caused nuisance due to crimes. In the crime analysis process, there are two main components that are usually present such as crime variables and crime matching [5]. The crime characteristics uniquely are described by the parameters of crime variables. Hence, it is considered as the main subject of crime analysis process. The process of assigning crimes or criminals to the previously solved or unsolved crime incidents is known as crime matching. In order to identify, discover and predict crime patterns a systematic approach is utilized of crime analysis [6]. All the data and information gathered from city police department considered as the input of a crime analysis system.

II. LITERATURE REVIEW

S Prabakaran, et.al (2018) presented in the huge dataset, the design and patterns are finding out by the present procedure in the data mining. In the convergence of machine learning and database framework, this method includes the different strategies [7]. In the various fields, this technique can be implemented such as future healthcare, market basket analysis, education, manufacturing engineering, crime investigation

many more. In order to process the crime characteristics, the crime investigation is an interesting application that helps the society for a better living. In this paper, they studied all the data mining techniques used in this domain. It becomes easy to design new strategies for crime prediction and analysis due to this study.

Prajakta Yerpude, et.al (2017) implemented the data mining techniques to crime data in this paper in order to predict features by which high crime rates are affected [8]. Data sets has been utilized to train, test and get desired results on them in the supervised learning while inconsistent, unstructured data has been divided in the unsupervised learning into classes or clusters. There are some supervised learning methods in data mining and machine learning such as decision trees, Naïve Bayes and Regression on previously collected data. These are responsible for causing crime in a region or locality by which features can be predicted. Necessary actions have been taken by the Crimes Record Bureau and Police Department on the basis of ranking of the features by which probability of occurrence of the crime can be decrease.

HARDI. M. PATEL, et.al (2017) presented for the analysis and investigation, data mining technique has been widely utilized due to the occurrence of crime. In order to model crime detection problems data mining techniques has been utilized. There are several ways by which cost and irritation on society causes due to crimes [9]. The main objective of this paper is to identify the specific types of crime and its location in which it will occur. On the basis of sentimental analysis, this approach is based in which lexicon-based method was implemented. They utilized twitter dataset here and also predict the future crime in particular area.

Anisha agarwal, et.al (2016) presented the issues related to sentencing criminals' bas they are more time consuming and sometimes run for many years. It is the potential threat to the society as most of the criminals released on bail even after they have served their sentence [10]. For the purpose of the prediction of various crimes performed by a criminal and for the prediction of repetition of each crime, use of pattern mining with association rules is done. This analysis will forced our law enforcement to take a more accurate decision by which protection to citizens can be provide easily as there are more chances of a criminal to do crime while he is on bail. Author's main focused in this paper was Apriori algorithm with association rule mining technique using which effective results achieved.

Chhaya Chauhan, et.al (2017) presented for the analysis and identification of patterns and trends in crime, it is required to use methodical approach that is crime analysis. In order to speed up the process of solving crimes, the Law enforcement officers are accessed by the crime data analysts due to increase of computerized systems [11]. Analytical and predictive techniques are the part of predictive policing by which criminal is identified and it is very affective in analyzing as well. It is not easy to analyzed the huge amount of crime data stored in warehouses manually due to the increased crime rate over the years and due to the more advancement in technology criminals are more aware of it due it utilize it for wrong

reasons. Therefore the enhancement of new technologies to empower the police to keep a check on crime is very important now-a-days.

Nelson Baloian, et.al (2017) proposed a crime prediction solution in this paper mainly developed for Chilean large cities. The three independent software modules are present in this novel approach using which prediction is made on the basis of different algorithms [12]. The cooperative integration of the individual ones is its final prediction. On the historical data, these developed systems has been tested and also measured that in the police field this performance is acceptable. On the basis of performed experiments, it is concluded that the joint performance is bigger as compared to the performance of each individual module. A theory was also validated that different features of the available data was exploited by the different algorithms.

Shyam Varan Nath, et.al (2016) presented data mining technique by which all the issues related to crime detection problems are solved easily. In order to attain the knowledge discovery from the crime records semi- supervised learning technique has been utilized by which the predictive accuracy is increased [13]. In this paper, they developed a weighting scheme for attributes so that limitations of box clustering tools and techniques can be handled. The implementation of a framework of data mining which works with geospatial crime plot is quite easy. It also enhances the productivity of detectives and other law enforcement departments. It can also be used for the implementation of activities against terrorism.

Ginger Saltos, et.al (2017) presented a novel approach through which the official data gathered by UK police is categorized through predictive models in the basis of types of crime, crimes per month and crimes per LSOA code. [14]. As Overall, it is feasible to generate the prediction models that are relevant to frequencies of crime from huge amounts of gathered data. The feasibility exists even when there is limited amount of information available. Further, the time frame for prediction, the amount of data required for reliable prediction models as well as specific types of crimes used for predictive models are to be done in future.

Authors' Names	Year	Description	Outcomes
S Prabakaran and Shilpa Mitra	2018	In this paper, they studied all the data mining techniques used in this domain.	It becomes easy to design new strategies for crime prediction and analysis due to this study.
Prajakta Yerpude and Vaishnavi Gudur	2018	The data mining techniques were implemented to crime data in this paper	Necessary actions have been taken by the Crimes Record Bureau and Police Department on

		in order to predict features by which high crime rates are affected	the basis of ranking of the features by which probability of occurrence of the crime can be decrease.
Hardi. M. Patel, Ripal Patel	2017	The main objective of this paper is to identify the specific types of crime and its location in which it will occur.	On the basis of sentimental analysis, this approach is based in which lexicon-based method was implemented. They utilized twitter dataset here and also predict the future crime in particular area.
Anisha Agarwal, Dhanashree Chougule, Arpita Agrawal, Divya Chimote	2016	The issues related to sentencing criminals' level of crime were presented such as they are more time consuming and sometimes run for many years.	Author's main focused in this paper was Apriori algorithm with association rule mining technique using which effective results achieved.
Chhaya Chauhan, Smriti Sehgal	2017	A crime prediction solution was proposed in this paper mainly developed for Chilean large cities.	The enhancement of new technologies to empower the police to keep a check on crime is very important now-a-days.
Nelson Baloian, Col. Enrique Bassaletti, Mario Fernández,	2017	A crime prediction solution was proposed in this paper mainly developed for Chilean large cities.	A theory was also validated that different features of the available data was exploited by the different algorithms.
Shyam Varan Nath	2016	In this paper, they developed a	The implementation of a framework
		weighting scheme for attributes so that limitations of box clustering tools and techniques can be handled.	of data mining which works with geospatial crime plot is quite easy. It also enhances the productivity of detectives and other law enforcement departments.
Ginger Saltos, and Mihaela Cocea	2017	A novel approach is proposed through which the official data gathered by UK police is categorized through predictive models in the basis of types of crime, crimes per month and crimes per LSOA code.	The feasibility exists even when there is limited amount of information available.

III. Conclusion

In this paper, it is concluded that data mining is the approach to extract useful information from the rough data. The prediction analysis is the technique of data mining which is applied to predict future possibilities from the current information. In this paper, various techniques of crime prediction analysis is reviewed in terms of certain parameters.

IV. References

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Prabhjot Kaur is a M.Tech Scholar candidate at the Department of Computer Science Engineering, RIMT University, Mandi Gobindgarh. She obtained her bachelor's degree from Guru Nanak Dev Engg. College, Ludhiana (PB). She has published one review paper in international journal.

Kirti Joshi is the Assistant Professor at the Department of Computer Science Engineering, RIMT University, Mandi Gobindgarh. She has published 21 research papers in national and international journals and conferences.