Machine Learning Based Crime Pattern Prediction

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Abstract

Thispaper describes the crime pattern prediction using machine learning algorithm. In order to analyze and have a response ahead this type of criminal activities, it is necessary to understand the crime patterns. Machine Learning Algorithm is implied in this work in order to classify among various crime patterns and the accuracy. Machine learning algorithm is implemented for the extraction of the features about the crime prediction. In this, Crime prediction is a systematic approach for finding the crime patterns and trends. It gives different technologies that can be used for building Crime prediction system. As we know, by building Crime Prediction System, it actually speeds up the process of solving crimes and reduces the rate of crime. This project helps to analyze and find the similarities as well as the differences of previous and recent crime patterns. It enhances the findings of previous loopholes of crime reports. With the increasing advent of computerized systems, crime data analysts can help the law enforcement officers to speed up the process of solving crimes. Using the concept of data mining, we can extract previously unknown and useful information from an unstructured data. Here we have an approach between computer science and criminal justice to develop a data mining procedure that can helps to solve crimes faster.In order to have a response for a crime, it is necessary to understand the crime patterns. Machine learning algorithms will be utilized in this work in order to classify among various crime patterns and to achieve accuracy. The dataset contains homicide entries. The proposed algorithm provides the high predicting efficiency .This project was written to assist researchers aiming to make crime prediction a reality and implement such advanced technology in real life.The output of the project will be in a graph format.Almost machine learning algorithms are used to find and provides the high efficiency and also the high accuracy. According to the crime types it could provide the exact comparison not on manually but with a correct accuracy with great efficiency.

Keywords— Crime, Numerous Safety Problems, Machine Learning, Data mining, Naive Bayes, Safe Route

1. INTRODUCTION

In recent times, crime has become an evident way of making people and society under trouble. Crimes are a common social problem affecting the quality of life and the economic growth of a society. It is considered an essential factor that determines whether or not people move to a new city and what places should be avoided when they travel. With the increase of crimes, law enforcement agencies are continuing to demand advanced geographic information systems and new data mining approaches to improve crime analytics and better protect their communities.Then crime is difficult to predict; it can occur anywhere at any time, which is a challenging issue for any society.Computer vision is a branch of artificial intelligence that trains the computer to understand and comprehend the visual world, and by doing so, creates a sense of understanding of a machine's surroundings.By having all of this previous information available, we hope to make our community safer for the people living there and also Machine learning (ML) is an application that provides a system with the ability to learn and improve automatically from past experiences without being explicitly programmed. In order to have a response for a crime, it is necessary to understand the crime patterns. The crime data is obtained from Kaggle open source. Machine learning algorithm Machine Learning Algorithms like Decision tree algorithm, KNN algorithm, Naïve Bayes algorithm will be utilized in this work in order to classify among various crime patterns and to achieve accuracy.Although various crimes and their underlying nature seem to be unpredictable and unforeseeable,the aim of this paper is to reduce the crime and provide required response for the crime happened.

2. EXISTING SYSTEM

In existing system we implemented supervised learning algorithm for prediction of crime report of system. ML algorithms and computer vision methods to predict both the nature of a crime and possibly pinpoint a culprit.Weka tool is implemented for predicted the crime report in this system. Weka is a collection of machine learning algorithms for data mining tasks. The algorithms can either be applied directly to a dataset and weka contains tools for data pre-processing, classification, regression, clustering, association rules and visualization. It is a powerful tool for developing machine learning models.

3. RELATED WORKS

Riya Rahul Shah et al (2020) proposed creating a model that can help to detect the number of crimes by its type in a particular state. Therefore the crime within a particular state can be reduced in a faster way.

The algorithm used for this project is KNN algorithm and Boosted decision trees. This provides higher accuracy in the prediction of crimes. Shiju Satyadeva , Devan M .S et al (2019), proposed on predicting the place of crimes like Murder, Sex abuse, Gang rape…. etc,. This helps the Police and the researchers to identify the markings left by the criminals in the spots. The Algorithm used for this project is Naïve Bayes algorithm. This Project is less time consuming and provides higher accuracy. Nishat Sarhma et al (2017), proposed on analyzing or finding the Hotspots based on time where crime occurred or any factor. The aim of this project is to find the location of the crime that has happened. By finding the location we may have the chance of finding the belongings of the victim as well as the criminal related to the crime. The algorithm used for this project is Ensemble methods, Logistic Regression algorithm. Mugdha Sharma et al (2015) discussed on detecting suspicious criminal activities through suspicious e-mails via Internet. The aim of this project is to find the criminals who are sending unnecessary messages and e-mails like threatening to the victims. The Algorithm used in this project is KNN algorithm. The Project provides low time consumption in terms of detecting the criminals. Abdus Sattar et al (2016) summarized on analyzing the rate of crime occurrence like hijack, kidnapping and harassment. By analyzing the data, we find out for many prediction rate of different crimes and use the algorithm to determine the prediction rate of path. The algorithm used in this project is SVM algorithm. The project provides higher accuracy.

4. PROPOSED SYSTEM

Machine learning based algorithm is implemented for predicting the crime in this system is shown in figure 1. After analyzing and understanding various distinct methods used by the police for surveillance purposes, we determined the importance of each method.Each surveillance method can perform well on its own and produce satisfactory results.This proposed algorithm is taken the dataset is obtained from the Kaggle repository. This is the domain for the various research-oriented dataset.The dataset contains homicide entries collected from the FBI's supplementary Homicide Report.The proposed algorithm provides high predicting efficiency.Naïve Bayes classifier is implemented for predicting the system with high efficiency. Data Sources have been extracting from the repository to extract the data for feature extraction in order to collect the available data in a previous history. It could categorize a domain of two, they are source domain and target domain. Due to domain adaptive normalization, source domain could be convert into adapted source and adapted target which is in a training set. To train an adapted source and adapted target for the transfer learning to the target domain which could give the prediction model as result is shown in figure 3.
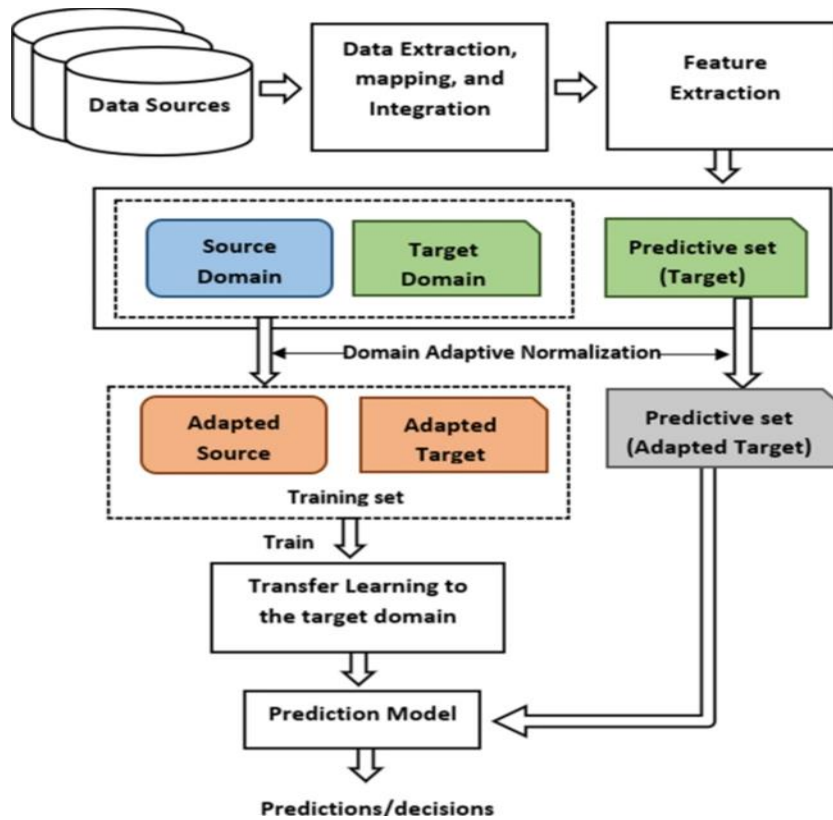
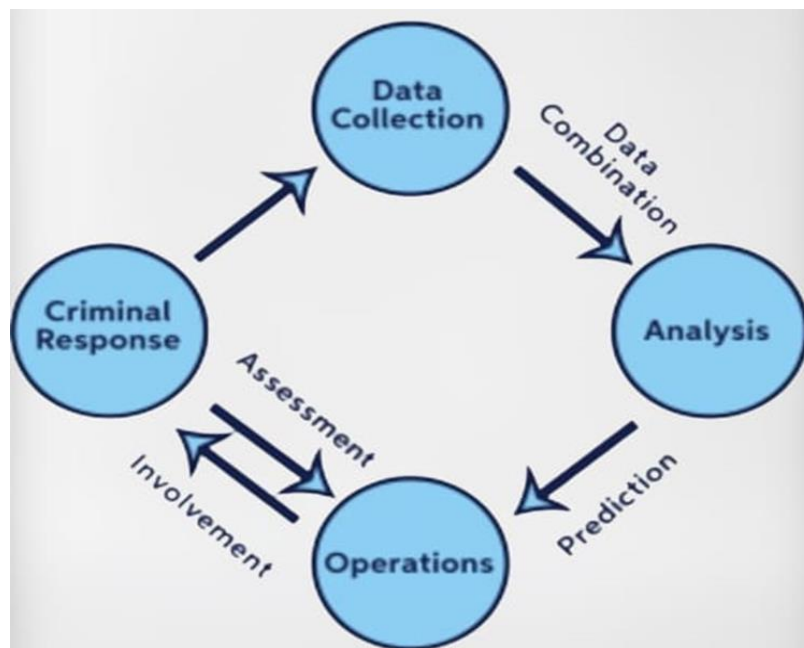**Figure 1: Proposed Crime Pattern Prediction System Architecture**

Figure 2: System Design for Crime Pattern Prediction
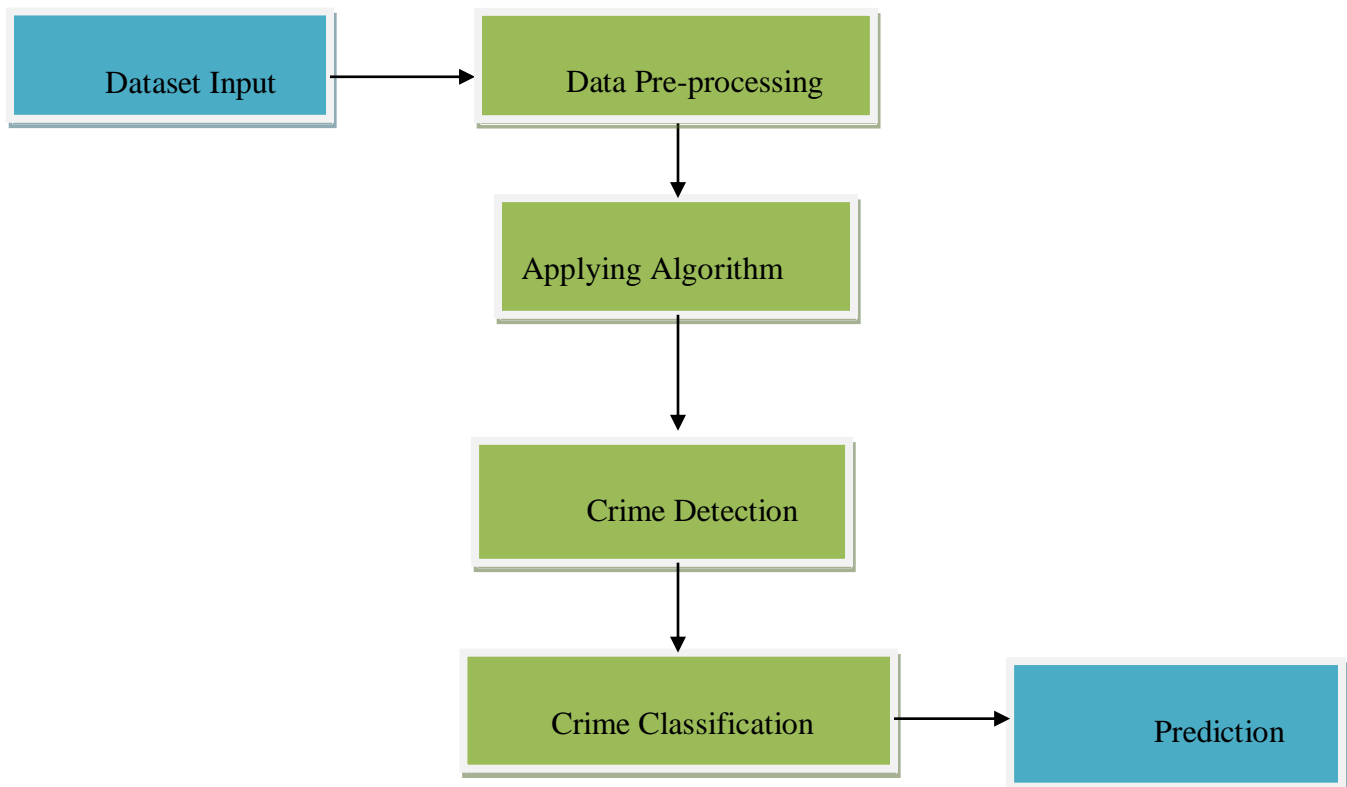
5. MODULES DESIGN & IMPLEMENTATION

Our proposed system consists of five modules which are Data Collection, Data Preprocessing, Feature Extraction, Prediction Development and Performance Evaluation. The flow of our proposed work is shown in figure 3.

i. Data Collection

Data collection is the process of gathering and measuring information on targeted variables in an established system, which then enables one to answer relevant questions and evaluate outcomes. In the module, crime data has been collected from the Police Department's Enforcement Analysis and System. The dataset used for the work is reliable, real and authentic as data is acquired from the official site.

ii. Data Preprocessing

In the pre-processing phase, removal of the inconsistent data (such as missing values, redundant information, etc.) and transformation of the data is done that is required for the predicting the crime in the following modules.

Figure 3: Data flow diagram for Crime Pattern Prediction

iii. Feature Extraction

Crime pattern is extracted and issending for the Training(Model Development).After the preprocessing the data is analysed and the Patterns and Features of the crime.

iv. Prediction Development

Model development is the process of training the machine learning models on the train data and test on the testing data.To identify the risk factor of the particular place, the machine learning algorithm such as SVM and gradient boosting will be used.

v. Performance Evaluation

In the project, Crime analysis for the city is performed.It makes aware about the future crime based on algorithms and crime data set we found out the crime rate in various section like area based crimes, crime type and weekly crime rates. This project shows future crime rate predictions are much more specific and precise.

6. CONCLUSION

This paper was written to assist researchers aiming to make crime prediction a reality and implement such advanced technology in real life.Although police do include the use of new technologies such as Sting Rays and facial recognition every few years, the implementation of such software can fundamentally change the way police work, in a much better way.This paper outlined a framework envisaging how the aspects of machine and deep learning, along with computer vision, can help create a system that is much more helpful to the police. The sparsity of crime in many areas complicates the application of the prediction of crimes. Naive Bayes and decision tree algorithms in which we discover distinct precision in different precision in different instances some linear operates good and provides better precision bot the general situation Naïve Bayes algorithm provides the appreciated accuracy other than that's why we use Naive bayes for our crime prediction scheme. By using these predict systems we will discover the stronger precision in the future and also by using this precision we will identify and discover the crime in rates. This project helps not only to find the crime pattern according to the particular crime type and also used to assist the researchers to discover new techniques which could be in an advanced manner. By incorporating such systems we can eradicate the crime in a faster rate.

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