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Crime Pattern Detection Using Data Science

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ABSTRACT: In recent years the data mining is data analyzing techniques that used to analyze crime data previously stored from various sources to find patterns and trends in crimes. In additional, it can be applied to increase efficiency in solving the crimes faster and also can be applied to automatically notify the crimes. However, there are many data mining techniques. In order to increase efficiency of crime detection, it is necessary to select the data mining techniques suitably.

KEYWORDS: Apriori algorithm

I. INTRODUCTION

Crime prevention and detection become an important trend in crime and a very challenging to solve crimes. Several studies have discovered various techniques to solve the crimes that used to many applications. Such studies can help speed up the process of solving crime and help the computerized systems detect the criminals automatically. In addition, the rapidly advancing technologies can help address such issues. However, the crime patterns are always changing and growing. The crime data previously stored from various sources have a tendency to increase steadily. As a consequence, the management and analysis with huge data are very difficult and complex. To solve the problems previously mentioned, data mining techniques employ many learning algorithms to extract hidden knowledge from huge volume of data. Data mining is data analyzing techniques to find patterns and trends in crimes. It can help solve the crimes more speedily and also can help alert the criminal detection automatically. Data Mining, also popularly known as Knowledge Discovery in Databases (KDD), refers to the nontrivial extraction of implicit, previously unknown and potentially useful information from data in databases. While data mining and knowledge discovery in databases (or KDD) are frequently treated as synonyms, data mining is actually part of the knowledge discovery process.

II. LITERATURE SURVEY

A simple experiment that took advantage of an Apriori algorithm was run to test whether significant patterns could be identified from a police-recorded bicycle-theft dataset. Unlike other research that has focused exclusively on the spatial and temporal aspects of crime pattern recognition using cluster or classification models, specific attributes related to modus operandi were included in our model to uncover potentially useful rules for the allocation of police resources. The findings suggest that attributes other than time and place, in this case modus operandi, can be utilised from police-recorded data for crime pattern analysis.[1]

We looked at the use of data mining for identifying crime patterns crime pattern using the clustering techniques. Our contribution here was to formulate crime pattern detection as machine learning task and to thereby use data mining to support police detectives in solving crimes. We identified the significant attributes; using expert based semi-supervised learning method and developed the scheme for weighting the significant attributes. Our modeling technique was able to identify the crime patterns from a large number of crime making the job for crime detectives easier.[2]

The biggest hurdle in the project was data acquisition and data staging. Asa future scope extension of crime detection and analysis will be to generate the crime hot-spots that will help in deployment of police at most likely places of crime for any given window of time, to allow most effective utilization of police resources. The developed model will reduce crimes and will help the crime detection field in many ways that is from arresting the criminals to reducing the crimes by carrying out various necessary measures.[3]

Three results in our experiments point to the value of leveraging the spatial knowledge inherent in the crime data set. The first and most obvious is the success of the simple 1NN classifier modified with a location constraint. Finding the most similar circumstance within the same neighborhood proved more effective than finding it within the entire city.

The second indicator is the success and stability of the probability-based Naive Bayes classifier. The basic logic of the location constrained 1NN is not unlike that of Naive Bayes namely that what has happened in a particular place in the past is likely to recur. The third result pointing to spatial knowledge is in the 24-by-20 grid data.[4]

Data mining applied in the context of law enforcement and intelligence analysis holds the promise of alleviating crime related problem. Using a wide range of techniques it is possible to discover useful information to assist in crime matching, not only of single crimes, but also of series of crimes. In this paper we use a clustering/classify based model to anticipate crime trends. The data mining techniques are used to analyze the crime data from database. The results of this data mining could potentially be used to lessen and even prevent crime for the forth coming years. we believe that crime data mining has a promising future for increasing the effectiveness and efficiency of criminal and intelligence analysis.[5]

In this paper we have applied the data mining techniques for identifying the Denial of Service attack. This type of attack is very dangerous as it jeopardizes the IT resources. It makes the server busy by imitation messagesand repeated queries. The server is congested by traffic packets, in order to mitigate the server performance. In this research paper, we have discussed about Cyber security, cyber-crimes their types, clustering, outliers and pattern recognition. We have applied the famous data mining technique called as pattern recognition on the log file. We set a threshold value. If the number of similar requests are received at the server, which is greater than the threshold value, we assume this as an attack and the administrator is been informed. By this approach we can identify the denial of service attack easily as in DoS attack, the attacker or the hacker sends same multiple requests in order to mitigate the server performance.[6]

III. SYSTEM ARCHITECTURE

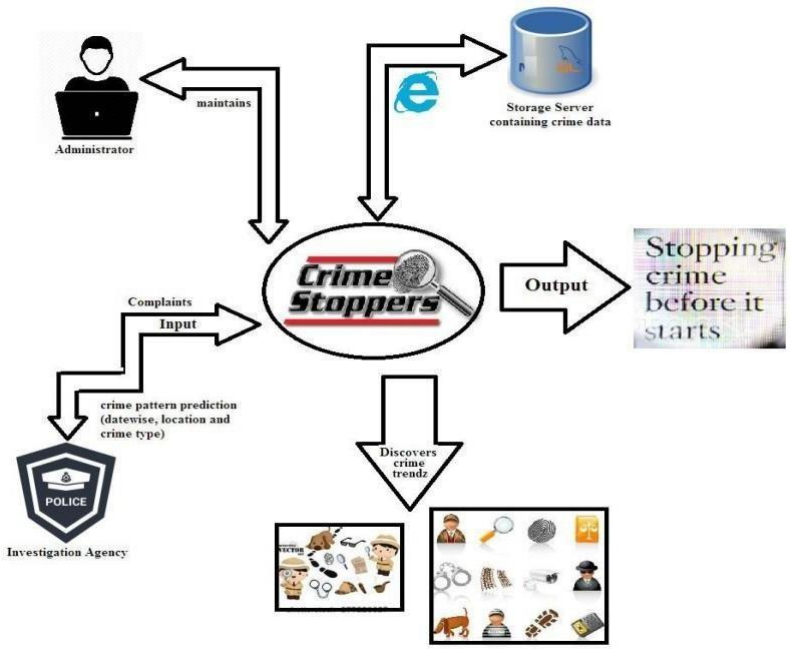

Figure1: System Architecture

Administrator: Administrator is a one who maintains the entire Crime system. Administrator has the full accessibility of the application (Crime system).

Investigation Agencies (Police Stations): Investigation Agencies are registered users. Investigation Agency is a one who receives the services from the application. The key service given by this Crime system is "prediction of Crime Trends" based on the previous crime data.

Public: Public is a one who visits the application, Public has only the limited accessibility.

Modules of the Project: Administrator has the following basic modules

Login Module: In this module, administrator of the application gets login to the application by inputting the credentials such as login id and password which is set in the server.

Manage Cities: In this module administrator manages cities by uploading cities into server. Managing of the cities means adding the new city, editing, updating and deleting the existing cities.

Manage Areas: In this module administrator of the system will add the areas based on the city and can edit, update and delete the existing areas.

Manage Investigation Agencies (IA): In this module, administrator registers the investigation agencies and can edit, update and delete the existing investigation agencies.

Set Id and Password of IA: Here administrator sets the unique id and password for each investigation agency. Using these credentials IA access the system.

IV. PROPOSEDWORK

Proposed system is applicable in the field of crime. Proposed system includes modeling of crimes for finding suitable algorithms to detect the crime, precise detection, data preparation and transformation, and processing time. Proposed system identifies crime behavior, crime predicting, precise detection, and managing large volumes of data obtained from various sources. Proposed system is an automation for complaints registration, crime pattern prediction based on the previous crime details collected from various sources.

V. WORKINGPROCEDURE

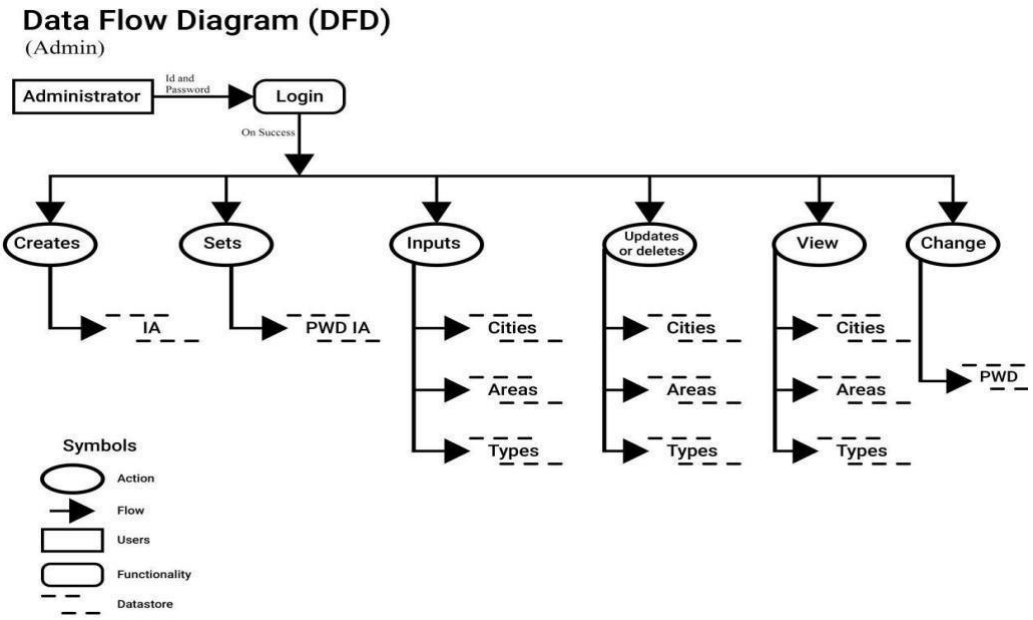

Figure 2: Diagram of Administrator Use case

Apriori algorithm is used to help prune the candidate explored during frequent item set generation to reduce the processing time apriori algorithm needs to scan the all items sets. So it uses a long period of time as well. Reference proposed the improved apriori algorithm by using the compressed data set algorithm for association rule mining to reduce the amount of time needed to read data from the database. This a novel algorithm will delete the transaction that not contained in interesting item set. Apriori designed and developed by has improved apriori algorithm to find the effective association rule and to reduce the amount of processing time. Additionally, there are several techniques that have been developed in order to analyze associations between two item sets effectively such as mutual information concept association bundle, audio watermarking etc.

Association rule mining is used to uncover closely related item sets in transactions for deciding business policies. Apriori algorithm is widely adopted is association rule mining for generating closely related item sets. Traditional apriori algorithm is space and time consuming since it requires repeated scanning of whole transaction database. In this paper we

propose improved apriori algorithm based on compressed transaction database. Transaction database is compressed based on the consequence of interest.

Apriori Algorithm

STEP 1: Scan the opinion data set and determine the support(s) of each item.
STEP 2: Generate L1 (Frequent one item set).
STEP 3: Use Lk-1, join Lk-1 to generate the set of candidate k - item set.
STEP 4: Scan the candidate k item set and generate the support of each candidate k – item set.
STEP 5: Add to frequent item set, until C=Null Set.
STEP 6: For each item in the frequent item set generate all non empty subsets.
STEP 7: For each non empty subset determine the confidence. If confidence is greater than or equal to this specified confidence .Then add to Strong Association Rule.

SnapShots

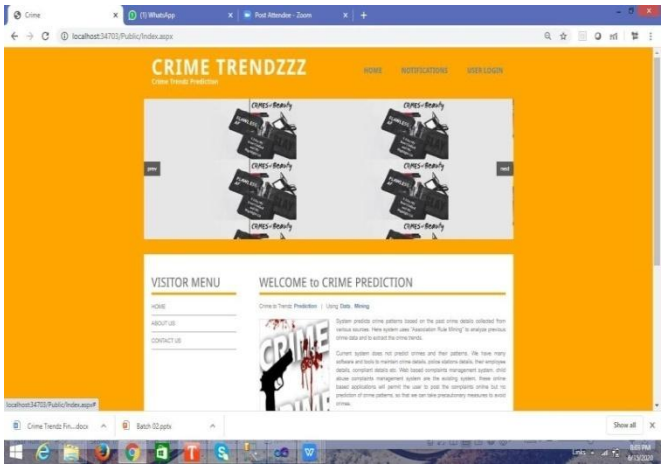

Figure 3: Login page

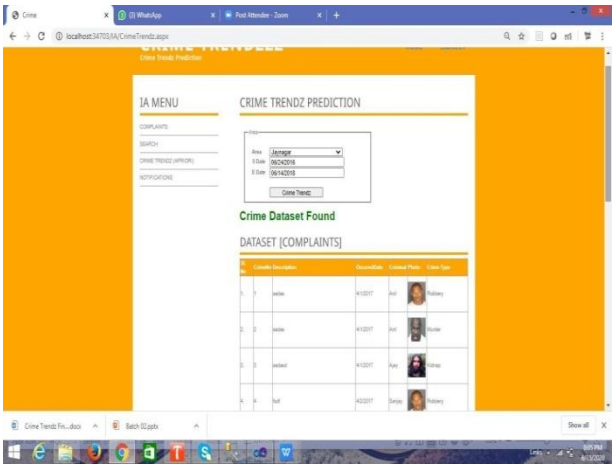

Figure 4: Output page

VI. CONCLUSION

Crime are characterized which change over time and increase continuously. The changing and increasing of crime lead to the issues of understanding the crime behaviour, crime predicting, precise detection, and managing large volumes of data obtained from various sources. Research interests have tried to solve these issues. However, these researches are still gaps in the crime detection accuracy. Thisleads tothe challenges in the field of crime detection. Thechallenges includemodeling of crimes for finding suitable algorithms to detect the crime, precise detection, data preparation and transformation, and processing time.

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