Novel Based Approach For Crime Data Visualization And Prediction Online And Offline

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Abstract- In India, there has been a drastic pattern of crime observed in the past few years giving rise to a threat to the security of common man. Considering this perilous situation, we aim to study these crime patterns and realize the changes in the overall Crime based on the data obtained from the social Indian Government websites. The raw data obtained was converted to a suitable format using data mining techniques such as eliminating missing values, eliminating redundant data, data transformation, etc.

This data was fed to algorithms like Linear Regression for performing predictions. Crime type predictions are performed, for four years, for each state as well as all the states of India using the data from past years. These predictions are displayed using simple visualization charts. One important aspect that is used with these algorithms is that of identifying the trend-changing year in order to increase the accuracy of the predictions. These visualizations are performed with the help of demographic data available at the Census India website. Each state in the visualizations are distinguished using factors like literacy and area in order to demonstrate the crime per one lakh people.

Under the predictions service, four major sectors of crime is considered - crime against women, crime against children, crimes under the Indian Penal Code (IPC) and crimes under Special and Local Laws (SLL).

Keywords- K-means, Naive Bayes, Crime prediction, Linear Regression, Random Forest

I. INTRODUCTION

The proposed analytical system includes the visualization of crime patterns over the past years. These visualizations are performed with the help of demographic data available at the Census India website. Each state in the visualizations are distinguished using factors like literacy and area in order to demonstrate the crime per one lakh people. While performing all these predictions and visualizations, we came across significant observations regarding the algorithms used, or certain crime types and the data related to it, which has also been incorporated in one of our modules. The website provides three main services - predictions, visualizations and

observations. Under the predictions service, four major sectors of crime is considered - crime against women, crime against children, crimes under the Indian Penal Code (IPC) and crimes under Special and Local Laws (SLL). The visualizations service consists of the total crime against women, total crimes against children and the total IPC crimes with respect to population of an area. The observations service provides a headline of all the notable statistics and information perceived during execution of the system. This website provides a user friendly environment for all its users to take the entire benefit of studying the crime patterns across all the states of India diverse purposes.
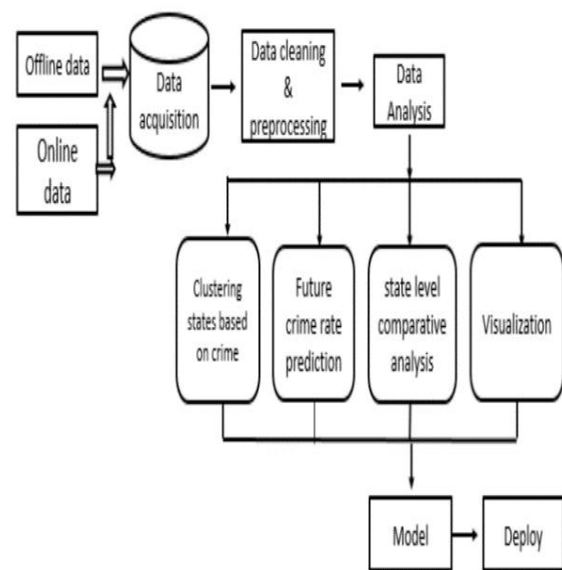

Fig.1 Architecture Diagram

Above shown diagram is the system architecture that clearly depicts every module of our system. The problem is invented and appropriate data is collected from the India National Crime Records Bureau. Collected data then undergoes pre-processing, cleaning, wrangling, managing and removing non values. Analysis of this data is done according to various aspects of crime patterns such as clustering states and districts based in the crime intensity, predictions of crime ratio in future, district level comparative analysis of crime etc. All the predictions are visualized on a dynamic website.

- Problem Identification : Visualization of crime data in order to predict the rate of crime and its severity in the forthcoming years, in different areas of the country based on the previous year criminal records of India.
- Data Acquisition: Acquisition of data from the official government websites National Crime Records Bureau (NCRB) Open Government Data, Census India.
- Data Cleaning and Pre-processing: Eliminating redundant values, Handling missing NA values, Data transformation.
- Exploratory Data Analysis:

    o Future Crime Rate Prediction: This module of the architecture would predict the crime patterns for coming four years.
    o State-level Comparative Analysis: This module would present the comparative observations for all type of users, including the region wise comparison and crime type wise comparison.
    o Visualizations: This module is for representing comparative information in Visuals for making the study easier and interesting and this will grab users interest.

- Model: This section represent complete model of the system with all the subsections and working algorithm.
- Deploy: The system is deployed and users can easily access the Website to analyze and check the predictions for various regions and crimes.

A. Mathematical definitions

System Description: In this system we are predicting and visualizing the various crime patterns of India. It includes a comparative analysis of various states of India based on number of crime cases reported.

Input: Year for prediction, State name, Crime Type.

Output: Predictions of crime up to the selected year, Comparative Analysis of state based on crime using animated graph, Illustrative visualizations of the total crime per state for each sector.

Data Structure and Data frames: Pandas data frame, list, numpy

Array Functions :Objects

Morphisms Overloading : Linear Regression Functional relations

Mathematical formulation:

Linear Regression:

Success Conditions: The success condition of this system includes optimally accurate predictions of the desired parameters.

Failure Conditions: The failure conditions mainly depend on the availability and consistency of the data.
y: Future prediction of crime(independent/predictive value)
x: Crime data(dependent value)
b: line intercept
m: Slope
Prediction of crime=year wise crime data * slope +line intercept.

II. CONCLUSION

Result of this research will be to present a system which will analyze, correlate and predict the crimes from huge data available. Results will be in the form of correlation between various crime and location of crime i.e. state/city. Crime can also be correlated on the basis of age group, location of crime type of crime. Prediction of the crime will be presented using various techniques and Algorithm. Another point noted is that the crime rate is increasing and crime prevention has become an upheaval task. The legal force departments around the world are required to remain ahead in the eternal race between lawbreakers and law enforcers. So we are presenting the system which maintains, predict and visualize the crime records and the people who are involved whether the Government official or the Police or it may be guilty. This System is designed specifically for crime analysis have been created to perform functions that are not available in other existing software. Thus, it can be understood that, even though several solutions to solve the problem has been proposed it can be seen that a perfect solution to each city, state and country is still elusive.

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