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CRIME PREDICTION AND REPORTING SYSTEM

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ABSTRACT

The increasing rate in criminal activities is a growing concern for any particular country/region. The system is a user-friendly web-based application for its stake-holders, i.e., Invigilators and end-users. The system caters the stakeholders by reporting of incidents by the individuals, who can not only report about a crime but also see the status of crime solution anywhere at any time. The system analyzes crime data from various criminal activity acknowledging websites and also filters them and provides data for every single relevant crime queried.

Keywords: Machine Learning, Crime Prediction, Artificial Intelligence in Crime solving and processing, Crime Reporting, Cyber security measures, data analytics.

I. INTRODUCTION

The vast expanding technology in the face of Artificial Intelligence and Machine Learning has seen an exponential growth over the last decade. The over-populated countries like India have to withstand a lot of issues regarding the rate at which the crimes are increasing. The system accommodates all the relevant bodies which are concerned with crime on a single platform. The system has been planned in such a way that an end-user like us or a normal citizen can log-in and report a crime based on various filters used like location and type of crime.

II. METHODOLOGY OF SYSTEM

In prediction, data collected from various websites is processed on which ML algorithm (simple linear regression) is performed. For prediction different parameters are been used (year, state , crime type) on which the prediction is done. The dataset for Crime Prediction and Visualization system is derived from from National Crime Records Bureau which is the official organization designed for crime datasets in India.

[1] AI/ML ALGORITHMS:

Machine Learning is used to train the machine by exposing it to similar kinds of data without it being programmed. Machine Learning takes various related parameters as input and predicts the dependent parameter also known as target variable. The Crime Prediction system is completely a Regression problem of ML. Thus, the data is preprocessed and passed into a Regression based ML algorithm (SLR). Simple Linear Regression turns out to be the most optimum algorithm for the Crime Prediction system.

[2] LINEAR REGRESSION:

A simple regression can be explained by using x as the independent variable and y as the dependent variable simply because the value of y can be determined by x. The point is, there is one target variable i.e. total cases to be determined using the inputs. Considering variable x as a year parameter, we can clearly state that y is proportional to x. However, it doesn't mean that the changes in y results in equal changes in x. We thus get y= b1 * x ; but the constant is always present in a situation like crime rate based on a certain year, b0 is the constant here. Total Cases = b0 + b1 * year OR y = b0 + b1* x.

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$$Y = b_0 + b_1 * X + \varepsilon$$

Y is dependent variable
b_0 is intercept of regression line
b_1 is slope
X is independent variable
ε is error term

Fig: 2.II.a

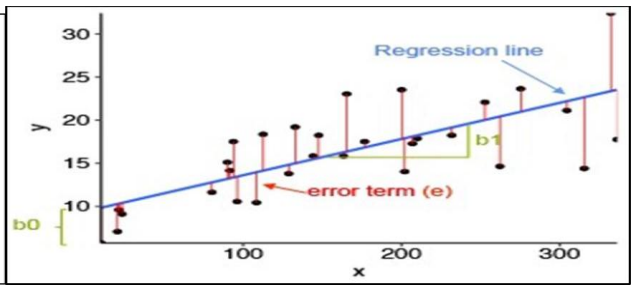

Fig: 2.II.b

[3] DATASETS

Data Collection: The dataset for Crime Prediction and Visualization system is derived from National Crime Records Bureau which is the official organization designed for crime datasets in India. Also, a smaller amount of data has been contributed through census India and other government websites.

Pre-Processing: The next step involves Data preprocessing and data cleaning. Any Machine Learning model needs data to perform well, so we need to preserve the data as much as we can and deal with null values in some other way. Thus, a median or interpolate() function from pandas was efficient in dealing with null values.

Post-processing: The data has to be converted into numpy type which is also a python library used for Data Science.

	Year	Rape	Kidnapping and Abduction of Women & Girls	Dowry Deaths	Assault on women with intent to outrage her modesty	Insult to the modesty of Women	Cruelty by Husband or his relatives	Importation of Girls from Foreign Country	Immoral Traffic (P) Act	Dowry Prohibition Act	Indecent Representation of Women (P) Act	Commission of Sati (P) Act	Total Crimes against Women
0	2001	16075	14645	6851	34124	9746	49170	114	8796	3222	1852	0	143795
1	2002	16373	14586	6822	33943	10155	49237	76	6598	2816	2508	0	143834
2	2003	15847	13296	6208	32939	12325	50703	46	5510	2684	1843	0	140631
3	2004	18233	15578	7026	34567	10801	58121	89	5748	3582	1378	0	154333
4	2005	18359	15750	6787	34175	9984	58319	149	5908	3204	2917	1	155553

FIGURE-5 CAW DATASET

Fig: 2.III.a

III. IMPLEMENTED SYSTEM

[1] System Architecture

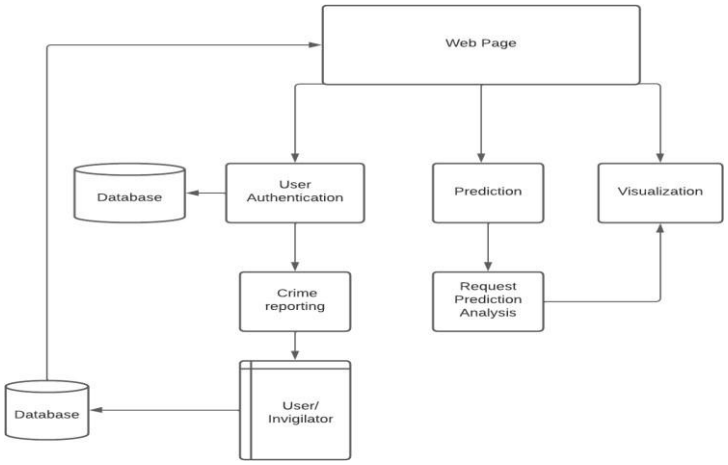

Figure 3: A.I

Any user can access this system without any authentication except for reporting a crime.Users can access our three-module prediction, crime reporting, and visualization

- For crime reporting, any stakeholder can login into the system to access the portal after authentication. A user can report a crime and keep track of reported crime, get access to the latest news and safety tips, etc. After reporting a crime, invigilators keep track of the crime and process it for further investigation.

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- Later, when the crime has been resolved, the invigilators proceed with the investigation as resolved which is reflected in the user's account as well. The admin keeps a record of the police station and updates weekly news, wanted and missing person lists.
- For prediction, there are three parameters (year, state and crime type) to predict a crime. Users can select any required parameter to predict a crime in a particular region.
- In visualization, users visualize different types of crime in a well-illustrated format. Information of all states are shown under crime type for the given period.

[2] IMPLEMENTATION:

The User page is a friendly interface to register and report a crime or complaint based on several filters like crime type, region etc. The portal consists of two architectures where a crime is either reported, predicted and visualized using the previous data.

Module 1: Crime Reporting

- Users, invigilator and admin can log in this module for reporting a crime or managing an account.
- A user can report a crime under various types of crime listed on the portal (crime against women, crime against children, IPC crime based on population (SL crimes).
- The user's complaint gets shown up on Invigilators interface and hence the case is processed by invigilator.

Module 2: Prediction System

- Simple linear regression was used to predict, where we have processed and trained the dataset to provide precise prediction output.
- For prediction there is no authentication process. Any user can access this feature, users have to select a year, state and crime type to predict in any particular year.
- There is a section for the admin, after authentication he can manage the web portal.

Module 3: Visualization System

- The next part of the system architecture consists mainly of Visualizations.
- In visualization just like prediction no authentication is required.
- Here, users can visualize the crime data in graph format by selecting crime type

[3] SYSTEM ALGORITHM:

Crime Reporting Algorithm

Step 1: Login into user valid credential

Step 2: After authentication on this page, we can find News, Safety Tips, Missing Persons and Most Wanted List.

Step 3: For Crime Reporting, users can report a crime which will further reflect on the Invigilators Page.

Step 4: Invigilator can then take actions for solving the crime and status of that crime will be reflected on User Login

Step 5: Admin can login after authentication and manage the portal.

Crime Prediction Algorithm:

Step1: Users can access the Prediction page without authentication.

Step2: For prediction, there are three parameters to select: year, crime type and state.

Step3: Users select this parameter for predicting crime in a particular year.

Crime Visualization Algorithm:

Step1: Users can access the visualization page without authentication.

Step2: User can visualize the data in the statistical graph format.

Step3: User can select the crime type and the data from the database will be shown in statistics.

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IV. RESULTS AND DISCUSSION

Figure 4: I

V. FUTURE SCOPE

- The major addition to the current system can be predicting who is likely to commit crime. Crimes like theft and burglary or pickpocketing can be detected even before it takes place with the help of such advancements.
- With the increasing rate of crime, all required bodies need to be associated under one roof for a crime- free India. This platform will help achieve a higher goal to set India crime-free.

VI. CONCLUSION

Thus we conclude that the system can predict, visualize and report a crime through a web portal. The patterns and insights which are not seen through the raw data stored in crime databases are now made more clearer and hence it ultimately helps in solving the crime at early stages. The system hence, establishes a sound scope for the stakeholders to report a crime without himself visiting a police station. The system also instills a adequate platform to predict a crime in near future.

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