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Intelligent Crime Prediction and Analysis Using Machine Learning Techniques

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Abstract: Crime is one of the biggest and dominating problem in our society. Daily there are huge number of crimes committed frequently. Here the dataset consists of the date and the crime rate that has taken place in the corresponding years. In this project the crime rate is only based on the robbery. We use linear regression algorithm to predict the percentage of the crime rate in the future by using the previous data information. The date is given as an input to the algorithm and the output is the percentage of the crime rate in that particular year.

Keywords: Crime Rate, Number of Crimes, Regression Algorithm, Machine Learning.

I. Introduction

Crimes are the significant threat to the humankind. There are many crimes thathappen in regular intervals of time. Perhaps it is increasing and spreading at a fast and vast rate. Crimes happen from small village, town to big cities. Crimes are of different type –robbery, murder, rape, assault, battery, false imprisonment, kidnapping, homicide. Sincecrimes are increasing there is a need to solve the cases in a much faster way. The crime activities have been increased at a faster rate and it is the responsibility of police department to control and reduce the crime activities. Crime prediction and criminal identification are the major problems to the police department as there are tremendous amount of crime data that exist. There is a need of technology through which the case solving could be faster.Through many documentation and cases, it came out that machine learning and data science can make the work easier and faster. The aim of this project is to make crime prediction using the features present in the dataset. The dataset is extracted from the official sites. With the help of machine learning algorithm, using python as core we can predict the type of crime which will occur in a particular area with crime percapita. The objective would be to train a model for prediction. The training would be done using Training data set which will be validated using the test dataset. The Multi Linear Regression (MLR) will be used for crime prediction. Visualization of dataset is done to analyze the crimes which may have occurred in a particular year and based on population and number of crimes. This work helps the law enforcement agencies to predict and detect the crime_percapita in an area and thus reduces the crime rate.

II. Machine Learning

Machine Learning is a sub-area of artificial intelligence, whereby the term refers to the ability of IT systems to independently find solutions to problems by recognizing patterns in databases. In other words: Machine Learning enables IT systems to recognize patterns on the basis of existing algorithms and data sets and to develop adequate solution concepts. Therefore, in Machine Learning, artificial knowledge is generated on the basis of experience.

In order to enable the software to independently generate solutions, the prior action of people is necessary. For example, the required algorithms and data must be fed into the systems in advance and the respective analysis rules for the recognition of patterns in the data stock must be defined. Once these two steps have been completed, the system can perform the following tasks by Machine Learning.

III. Related Work

Crime rate prediction is different in various applications, some of the studies are given below:C.P. Chaithanya, N. Manohar, Ajay Bazil Issac, describes Text detection is the method of locating areas in a picture wherever, text is present. Text detection and classification in natural pictures is very important for several computer vision applications like optical character recognition, distinguish between human and machine inputs and spam removal. Currently the challenge in text identifying is to detect the text in natural pictures due to many factors like, low- quality image, unclear words, typical font, image having a lot of color stroke than the background color, blurred pictures due to some natural problems like rain, sunny, snow, etc. The main aim of this work is to identify and classify the text in natural pictures. Here system detects the text and finds the connected regions, chain them together in their relative position. Uses a text classification engine to filter chains with low classification confidence scores [1]. Shiju Sathyadevan, Devan M.S, proposed that Day by day the crime rate is increasing considerably. Crime cannot be predicted since it is neither systematic nor random. Also the modern technologies and hi-tech methods help criminals in achieving their misdeeds. According to Crime Records Bureau crimes like burglary, arson etc have been decreased while crimes like murder, sex abuse, gang rape etc have been increased. Even though we cannot predict who all may be the victims of crime but can predict the place that has probability for its occurrence. The predicted results cannot be assured of 100% accuracy but the results shows that our application helps in reducing crime rate to a certain extent by providing security in crime sensitive areas. So for building such a powerful crime analytics tool we have to collect crime records and evaluate it .It is only within the last few decades that the technology made spatial data mining a practical solution for wide audiences of Law enforcement officials which is affordable and available. Since the availability of criminal data or records is limited we are collecting crime data from various sources like web sites, news sites, blogs, social media, RSS feeds etc. This huge data is used as a record for creating a crime record database. So the main challenge in front of us is developing a better, efficient crime pattern detection tool to identify crime patterns effectively [2].

IV. Proposed System

This project has undergone the following process:

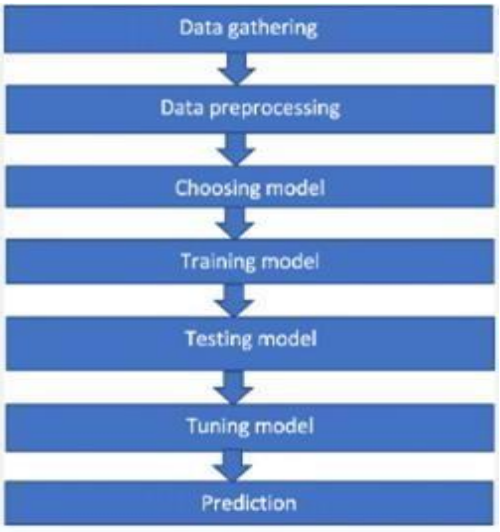

Fig 1: Proposed Architecture

Testing a model's ability to anticipate would be the goal. Utilizing the training dataset, the test dataset will be used to validate the training. Depending on the accuracy, a better algorithm will be used to build the model. For

crime prediction, supervised classification and other algorithms will be employed. To examine potential crimes that may have occurred in the nation, the dataset is visualized. The crime rate in India is decreased as a result of this work's assistance to law enforcement organizations in predicting and detecting crimes more accurately. This facilitates the completion of other formalities by all other departments. Building a model that can make predictions is done through predictive modeling. A machine learning algorithm that learns specific attributes is used in the process. As the result of a prediction, a classification model assigns discrete class labels to a specific data value. A pattern classification problem in weather forecasting could be the prediction of a sunny, wet, or snowy day. This is an example of a classification model. The two categories of supervised learning and unsupervised learning can be used to split pattern classification jobs. In supervised learning, the classification model's input dataset's class labels are predetermined. When dealing with a supervised learning problem, it would be aware of which training dataset has the specific output that will be trained so that prediction might be made. This analysis looks at general tendencies that could aid in model and hyper parameter selection as well as which features are most useful in The discrepancy between actual records and our predicted values for both years indicates that the suggested approaches are between 85% and 90% accurate.

In the future, when there are enough data points to use machine learning (ML) models, this study can be modified to forecast crime using ML models. Additionally, it may improve prediction accuracy. Additionally, statistical modeling techniques can be combined with ML models to generate weighted accuracy for a district, which helps strengthen the solution. predicting crime rate. The objective is to categorize the level of criminality in order to find fraud hotspots in the actual world.

Testing The Dataset

Steps in testing the dataset, are the following

1. The predict method, which accepts this array as input and produces the expected target value as output, is now used to forecast the species of the new features in a numpy array called "n."

2. As a result, the expected goal value is zero.By comparing the actual values of the test set with the projected values, it is possible to determine the test score, which is calculated as the ratio of the number of correctly predicted outcomes to the total number of predictions made.

3. The first line imports the preconfigured iris data set from the Sklearn module. The raw data set is essentially a table that provides details about distinct types.

4. For use in this application, import any algorithm and the train test split class from the sklearn and numpy modules.

5. To include the data dataset variable's load data() method. Using the train test split function, further split the dataset into training and test data. The variable's X and Y prefixes stand for the feature and target values, respectively.

6. Using a ratio of 67:33:70:30, this method randomly divides the dataset into training and test data. Then any algorithm is enclosed.

7. In order to train the computer, we fit our training data into this algorithm in the following line.

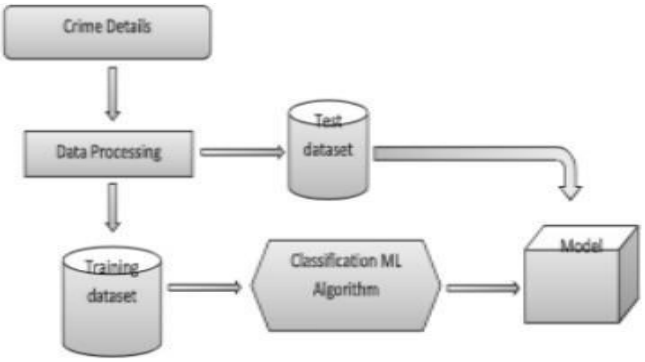

Fig 2: Architecture of proposed system

V. Conclusion

Finding relationships and patterns among varied data has become much simpler with the use of machine learning technology. The major task of this research is to determine the type of crime that might occur given the place where it has already happened. Using a training set of data that has undergone data cleansing and data transformation, we have developed a model using the machine learning idea. With an accuracy of 0.789, the model can identify the type of crime. Analyzing a data set is made easier by data visualisation. The graphs include bar, pie, line, and scatter diagrams, each with their unique features. We created numerous graphs and discovered intriguing data that assisted in studying crime datasets that can assist in identifying the elements that can help in keeping society clean.

References

[1]. Ashish Sharma, Dinesh Bhuriya, Upendra Singh. "Survey of Stock Market Prediction Using Machine Learning Approach", ICECA 2017.
[2]. Machine Learning in Production: Developing and Optimizing Data Science Workflows and Applications (Addition-Wesley Data & Analytics)
[3]. Python : The Complete Reference - Martin C. Brown
[4]. https://docs.anaconda.com/anaconda/install/wind ows
[5]. A.U.S.S Pradeep, SorenGoyal, J. A. Bloom, I. J. Cox, and M. Miller, —Detection of statistical arbitrage using machine learning techniques in Indian Stock market,‖ IIT Kanpur, April 15, 2013.
[6]. Prashant S. Chavan, Prof. Dr. Shrishail. T. Patil —Parameters for Stock Market Prediction,‖ Prashant S Chavan et al, Int.J.Computer Technology & Applications, Vol 4 (2),337-340.
[7]. NeelimaBudhani, Dr. C. K. Jha, Sandeep K. Budhani—Prediction of Stock Market Using Artificial Neural Network,‖ International Conference on Soft Computing Techniques for Engineering and Technology (ICSCTET)- 2014.
[8]. SharvilKatariya, Saurabh Jain—Stock Price Trend Forecasting using Supervised Learning Methods.
[9]. DhirajMundada, GauravChhaparwal, SachinChaudhari, and TruptiBhamare— Stock Value Prediction System,‖ International Journal on Recent and Innovation Trends in Computing and Communication, April 2015
[10].Hochreiter, Sepp, and Jürgen Schmidhuber—Long short-term memory,‖ Neural computation 9.8 (1997): 1735-1780.
[11].Yadav, S., Timbadia, M., Yadav, A., Vishwakarma, R., & Yadav, N. (2017, April). Crime pattern detection, analysis & prediction. In Electronics, Communication and AerospaceTechnology (ICECA), 2017 International conference of (Vol. 1, pp. 225- 230). IEEE.

[12].Shamsuddin, N. H. M., Ali, N. A., &Alwee, R. (2017, May). An overview on crime prediction methods. In Student Project Conference (ICTISPC), 2017 6th ICT International (pp. 1-5). IEEE.
[13].Sivaranjani, S., Sivakumari, S., &Aasha, M. (2016, October). Crime prediction and forecasting in Tamilnadu using clustering approaches. In Emerging Technological Trends (ICETT),
[14].Sathyadevan, S., &Gangadharan, S. (2014, August). Crime analysis and prediction using data mining. In Networks & Soft Computing (ICNSC), 2014 First International Conference on (pp. 406-412). IEEE.
[15].Nath, S. V. (2006, December). Crime pattern detection using data mining. In Web intelligence and intelligent agent technology workshops, 2006. wi-iat 2006 workshops. 2006 ieee/wic/acm international conference on (pp. 41-44). IEEE.
[16].Zhao, X., & Tang, J. (2017, November). Exploring Transfer Learning for Crime Prediction. In Data Mining Workshops (ICDMW), 2017 IEEE International Conference on (pp. 1158-1159). IEEE.
[17].Al Boni, M., & Gerber, M. S. (2016, December). AreaSpecific Crime Prediction Models. In Machine Learning and Applications (ICMLA), 2016 15th IEEE International Conference on (pp. 671-676). IEEE.
[18].Tayebi, M. A., Gla, U., &Brantingham, P. L. (2015, May). Learning where to inspect: location learning for crime prediction. In Intelligence and Security Informatics (ISI), 2021 IEEE International Conference on (pp. 25-30). IEEE.

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