SafeCityAI: A Crime Prediction Web App for Accurate Crime Predictions

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Abstract- ***In order to effectively respond to criminal activities, it is crucial to familiarize oneself with the patterns in which these crimes occur and predict them before they happen. This project aims to predict the time and location where crime is most likely to happen in the near future, enabling proactive prevention measures. Utilizing artificial intelligence and machine learning for crime prediction has shown promise; however, its adoption is still limited, possibly due to the challenges of establishing causality and taking necessary actions to prevent crimes. To enhance comprehensibility, the dataset has been simplified by dropping or merging certain columns. Furthermore, future implementations could involve developing a nationwide crime prediction model at a centralized level, transcending state boundaries.***

Keywords: crime prediction, dataset analysis, artificial intelligence, machine learning, prevention measures

I. INTRODUCTION

Accurate and efficient crime predictions [1] are crucial in various aspects such as prevention and study. The ability to make informed decisions and plan activities depends heavily on up-to-date and precise crime dataset. With the rapid advancements in technology and the availability of criminal data, innovative crime prediction system have emerged to enhance the accuracy of the predictions. In this context, the introduction of "SafeCityAI" represents a significant milestone in crime prediction, offering a cutting-edge web application designed to provide accurate predictions on the data entered for crime prediction.

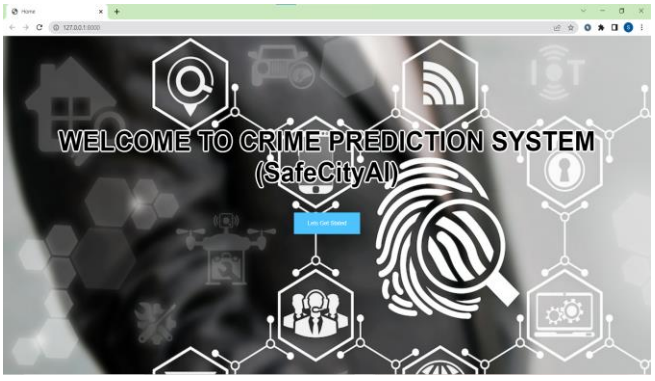
The development of SafeCityAI is driven by the recognition of the increasing crime rates in the society. From planning preventive measures and study the pattern of criminal activities. Earlier used methods of predicting crime fall short in terms of accuracy. Crime prediction often results in clustered data, making it difficult to understand and work with.

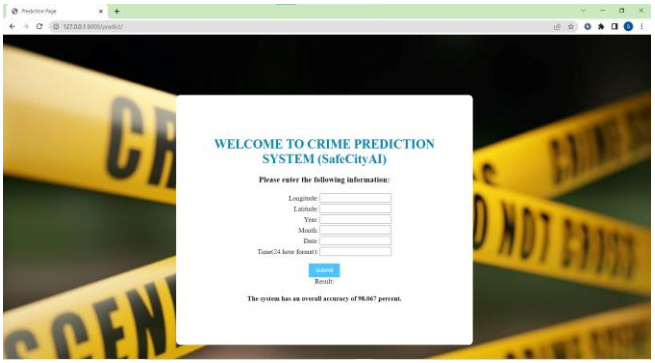
SafeCityAI aims to overcome these limitations by offering a comprehensive web application that requires the timestamp and location to predict whether crime will take place or not. Leveraging the power of sophisticated algorithms and data analytics, SafeCityAI processes a wide range of criminal data from reliable sources to deliver precise predictions. By using Django web Framework and HTML, CSS and JavaScript languages, SafeCityAI ensures that the web application is easy to use and understand by the user for a seamless experience.

The primary goal of SafeCityAI is to provide users with a simplified and effective tool for predicting accurate crime information. The application's interface is designed to cater to officials with varying levels of criminal activities. SafeCityAI empowers users to make informed decisions and adapt to prevent crime.

Beyond convenience, SafeCityAI has the potential to impact the increasing rate of criminal activities by making accurate predictions. Bureau for Criminal activities can use SafeCityAI in order to study the criminal activities, prevent crimes and regulate emergency orders. By providing reliable crime predictions and actionable insights, SafeCityAI aims to improve preparedness, support efficient decision-making processes, and contribute to the well-being and safety of individuals and communities.

In this research paper, we present the development process and features of SafeCityAI, outlining the methodology used to create this advanced crime predicting web application. We delve into the utilization of Django web framework [2] for building the user interface, the data preprocessing techniques employed to ensure data accuracy, and the data analysis methods utilized to uncover meaningful crime patterns. Furthermore, we explore the key features that differentiate SafeCityAI from existing weather applications, highlighting its potential impact on sector reliant on crime predictions. By enhancing preparedness, improving decision-making processes, and fostering a safer environment, SafeCityAI strives to be a valuable tool for officials for navigating the intricacies of crime prediction.





II. LITERATURE REVIEW

Crime Prediction is a subject of extensive research, and numerous studies have focused on improving the accuracy and usability of crime prediction tools. This section provides a comprehensive review of existing research and literature on crime prediction and related technologies, highlighting their strengths, limitations, and the challenges faced in accessing accurate and user-friendly criminal information.

The review begins by examining the current state of crime prediction tools [3]. Various traditional methods, such as weather reports and basic weather applications, have been widely used to obtain weather information. However, these methods often suffer from limitations such as outdated data, limited geographical coverage, and a lack of real-time updates. Researchers have identified these shortcomings and have been actively working on developing innovative solutions to overcome these challenges.

Advancements in technology, particularly in the areas of data collection, data analysis, and computational power, have paved the way for more sophisticated weather prediction tools. Machine learning algorithms, artificial intelligence, and big data analytics have emerged as powerful techniques for improving the accuracy of weather forecasts. These technologies allow for the integration of vast amounts of meteorological data from diverse sources, enabling more precise predictions and a better understanding of complex weather patterns.

User requirements and challenges in accessing accurate and user-friendly weather information have been another focus of research. Studies have investigated the needs of different user groups, including individuals, industries, and emergency response organizations. User-friendly interfaces, real-time updates, personalized alerts, and interactive visualizations have been identified as crucial features for enhancing the usability and effectiveness of weather applications. Additionally, challenges such as data quality, data standardization, and data privacy have been addressed to ensure the reliability and trustworthiness of weather prediction tools.

The literature review also examines relevant studies or projects that have addressed similar issues or developed similar applications. These projects provide valuable insights into best practices, methodologies, and approaches for designing and implementing weather web applications. By drawing upon the experiences and lessons learned from these studies, Forecast-Ease aims to incorporate the most effective strategies and techniques into its development process.

By conducting a thorough literature review, this research paper establishes a solid foundation of knowledge and understanding in the field of weather forecasting and related technologies. The review highlights the strengths and limitations of current weather prediction tools, identifies user requirements and challenges, and explores previous studies and projects that have tackled similar issues. This comprehensive analysis sets the stage for the subsequent sections of the paper, where we present the development and features of Forecast-Ease, showcasing how it addresses the identified gaps and contributes to the advancement of accurate and user-friendly weather predictions.

III. METHODOLOGY

This section provides a detailed explanation of the methodology employed in the development of SafeCityAI, highlighting the algorithms, data analytics techniques, technologies, frameworks, and data sources utilized to create a robust and accurate crime prediction web application.

Crime Prediction Algorithm:
SafeCityAI utilizes Random Forest algorithms [4] to process criminal data and generate accurate crime predictions. This algorithm leverage machine learning and statistical modeling approaches to analyze historical crime patterns, identify trends, and make informed predictions. Techniques such as regression analysis and matric analysis are employed to enhance the accuracy and reliability of the prediction.

Technologies, Frameworks, and Tools:
The development of SafeCityAI relies on a range of technologies, frameworks, and tools to ensure its functionality and performance. The web application is built using modern web development technologies such as HTML, CSS, and JavaScript. SK-Learn [5], a popular python library, is employed for creating the predicting model and JavaScript enables the development of interactive and responsive components.

Data Sources:
To gather the necessary criminal data, SafeCityAI integrates various reliable and comprehensive data sources. These sources may include state police data, court case data and other study related data.

The methodology section further divided into three subparts such as Data Preprocessing, model application and web application development. In the beginning the data is process in

order to create the usable and required data set by applying pre-processing task such as merging, deleting or adding columns in the data. After that the data is passed to an AI model to learn and predict the future events on the basis of the given data. Then the third part application or user interface comes into the role which will show the output of the system to the user.

IV. IMPLEMENTATION

The implementation of SafeCityAI involved developing a crime prediction web application using Django, a web framework for building user interfaces.

The implementation starts with preprocessing the initial dataset to transform it as per the requirement of our project. In this phase the unnecessary columns and rows are dropped, new columns are formed by merging different columns, null values are removed and the required structure of the dataset is defined.

Then the model generation and application process start where SafeCityAI uses different libraries such as pandas and sklearn for uploading and analyzing data from the dataset created in the previous step and divide it into two parts such as test data and train data. Then the matrix of output is created to predict the crime events in the future. The model is then trained first using the train data and then check it using the test data. After that check the score of prediction in order to get the accuracy of the model.

Then the web application development phase starts where SafeCityAI uses Django web framework to host the web application over the browser and then design it using the HTML and CSS language. SafeCityAI consists of three main code pages such as view.py which contains the model function and various other functions, home.html which hold the basic structure and designs used in the home page of the web application and predict.html which uses the functions defined in the view.py page to predict the result of the search and show it on the prediction page of the web application.

view.py

```
from django.shortcuts import render
import pandas as pd
from sklearn.model_selection import
train_test_split
from sklearn.ensemble import Random-
ForestClassifier
def home(request):
    return render(request, 'home.html')
def predict(request):
    return render(request, 'pre-
dict.html')
def result(request):
    dataset = pd.read_csv(r'C:\Us-
ers\satyam\Desktop\SafeCityAI\data.csv')
    data = pd.read_csv(r'C:\Us-
ers\satyam\Desktop\SafeCityAI\data.csv')
    for col in data:
        print(type(data[col][1]))
    data['timestamp'] =
pd.to_datetime(data['timestamp'], er-
rors='coerce')
    data['timestamp'] =
pd.to_datetime(data['timestamp'], for-
mat='%d/%m/%Y %H:%M:%S')
    column_1 = data.iloc[:, 0]
    db = pd.DataFrame({"year": col-
umn_1.dt.year,
                       "month": col-
umn_1.dt.month,
                       "day": col-
umn_1.dt.day,
                       "hour": col-
umn_1.dt.hour,
                       "dayofyear": col-
umn_1.dt.dayofyear,
                       "week": col-
umn_1.dt.week,
                       "weekofyear": col-
umn_1.dt.weekofyear,
                       "dayofweek": col-
umn_1.dt.dayofweek,
                       "weekday": col-
umn_1.dt.weekday,
                       "quarter": col-
umn_1.dt.quarter,
                       })
    dataset1 = dataset.drop('timestamp',
axis=1)
    data1 = pd.concat([db, dataset1],
axis=1)
    data1.dropna(inplace=True)
    X = data1.iloc[:, [0, 1, 2, 3,  16,
17]].values
    y = data1.iloc[:, [10, 11, 12, 13,
14, 15]].values
    X_train, X_test, y_train, y_test =
train_test_split(X, y, test_size=0.20,
random_state=50)
    rfc = RandomForestClassifier(n_esti-
mators=100)
    rfc.fit(X_train, y_train)
    val1=float(request.GET['n1'])
    val2 = float(request.GET['n2'])
    val3= float(request.GET['n3'])
    val4=float(request.GET['n4'])
    val5 = float(request.GET['n5'])
    val6 = float(request.GET['n6'])
    pred=rfc.predict([[ val3,
val4,val5,val6,val1,val2]])
    result1=""
    if pred.any()==1:
```

```
        result1=" Crime is likely to hap-
pen."
    else:
        result1=" Crime is not likely to
happen"
    return render(request, 'pre-
dict.html', {"result2":result1})
```

home.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Home</title>
    <style type= text/css>
        div{
            color:black;

        }
        h1{
            color: 'white';
            font-family: arial, sans-
serif;
            font-size: 60px;
            font-weight: bold;
            text-shadow: 3px 0 #fff, -3px
0 #fff, 0 3px #fff, 0 -3px #fff,
                2px 2px #fff, -2px -2px
#fff, 2px -2px #fff, -2px 2px #fff;
            margin-top: 200px;
        }
        h2{
            color: 'white';
            font-family: arial, sans-
serif;
            font-size: 15px;
            font-weight: bold;
            margin-top: 400px;
        }
        body {
            background-image: url("{%
static 'CrimePrediction/Images/Home_Back-
ground.jpg' %}");
            background-repeat: no-repeat;
            background-attachment: fixed;
            background-size: cover;
        }
        input[type=submit]{
            background-color: #4dc3ff;
            border: 2px;
            color: white;
            padding: 16px 32px;
            cursor: pointer;
            margin-top: 15px;
        }
    </style>
</head>
<body>
    <div align = 'center'>
        <h1>WELCOME TO CRIME PREDICTION
SYSTEM (SafeCityAI)</h1>
        <form action="predict">
            <input type="submit"
value="Lets Get Stated">
        </form>
    </div>
</body>
</html>
```

predict.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Prediction Page</title>
    <style>
        div{
            color:black;
        }
        body {
            background-image: url("{%
static 'CrimePrediction/Images/Pred-
Page.jpg' %}");
            background-repeat: no-repeat;
            background-attachment: fixed;
            background-size: cover;
        }
        .main{
            position: fixed;
            top: 140px;
            left: 410px;
            width: 550px;
            background-color:#ffffff;
            border-radius: 10px;
            align-items: center;
            padding: 5%;
        }
        h1{
            color: #0086b3;
            font-size: 30px;
            font-weight: bold;
        }
        input[type=submit]{
            background-color: #4dc3ff;
            border: 2px;
            color: white;
            padding: 8px 16px;
            cursor: pointer;
            margin-top: 15px;
        }
    </style>
</head>
```

```
<body>
<div align='center' class="main">
    <h1> WELCOME TO CRIME PREDICTION SYS-
TEM (SafeCityAI) </h1>
    <h3>Please enter the following infor-
mation:</h3>
    <form action="result">
        <table>
            <tr>
                <td align="right" >Longi-
tude:</td>
                <td align="left"><input
type="text" name="n1"></td>
            </tr>
            <tr>
                <td align="right" >Lati-
tude:</td>
                <td align="left"><input
type="text" name="n2"></td>
            </tr>
            <tr>
                <td align="right"
>Year:</td>
                <td align="left"><input
type="text" name="n3"></td>
            </tr>
            <tr>
                <td align="right"
>Month:</td>
                <td align="left"><input
type="text" name="n4"></td>
            </tr>
            <tr>
                <td align="right"
>Date:</td>
                <td align="left"><input
type="text" name="n5"></td>
            </tr>
            <tr>
                <td align="right"
>Time(24 hour format):</td>
                <td align="left"><input
type="text" name="n6"></td>
            </tr>
        </table>
        <input type="submit">
    </form>
    Result:{{result2}}
    <h4>The system has an overall accu-
racy of 98.067 percent.</h4>
</div>
</body>
</html>
```

V. RESULTS AND DISCUSSION

The Results and Discussion section presents the outcomes of the development process of SafeCityAI, including performance evaluations, accuracy assessments and its effectiveness in providing accurate crime predictions.

Performance Evaluations and Accuracy Assessments:
In this subsection, the performance of SafeCityAI is evaluated based on various metrics such as response time, data processing speed, and system reliability. Performance benchmarks are established to measure the application's efficiency and responsiveness. Accuracy assessments are conducted to evaluate the precision of the crime predictions generated by SafeCityAI, comparing them with ground truth data and established crime prediction models. These evaluations provide insights into the application's reliability and performance in delivering accurate criminal predicitons.

Impact on society:
SafeCityAI provides a better way to study and predict the criminal activities which enables the respected authorities to prevent those crime before it happens, results in a better and safer environment in the society. It helps to boost the efficiency of law & order authorities.

Strengths, Limitations, and Challenges:
limitation of the SafeCityAI crime prediction system is the use of a single dataset for training and evaluation. The inclusion of multiple datasets from diverse sources could enhance the accuracy and generalizability of the crime prediction model. Future research should explore the incorporation of additional datasets to improve the system's performance.

Future Enhancements and Directions:
There is still a lot of scope for improvement in terms of data quality and the performance of the algorithms. In the future, we plan to expand our project to other cities in India and incorporate more features such as weather, demographics, and social media data to improve the accuracy of the predictions.

VI. CONCLUSION

Crime prediction systems, such as the SafeCityAI system, provide valuable tools for estimating crime rates and identifying crime patterns. However, there are limitations that need to be addressed to improve the accuracy and effectiveness of these systems. By integrating socio-economic data, incorporating multiple datasets, and evaluating law enforcement strategies, crime prediction models can be enhanced, leading to better-informed decision-making and improved public safety
We hope that our project will serve as a starting point for further research in this area, and that it will inspire policymakers to invest in crime prevention technology to make our cities safer for everyone.

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While we have made every effort to acknowledge all individuals and organizations who have contributed to this research, we apologize if we have inadvertently overlooked anyone. We deeply appreciate the collective effort and collaboration that has shaped this research and the development of SafeCityAI.

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