WOMEN SAFETY ANALYTICS – PROTECTING WOMEN FROM SAFETY THREATS

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ABSTRACT- ***This project presents a Women Safety Analytics – Protecting Women from Safety Threats system that uses Machine Learning techniques to predict safety risk levels based on environmental and location-related factors. The system enhances women's safety by analyzing parameters such as city, area, time of day, lighting score, police station distance, crowd density, and weather conditions. It ensures timely risk prediction and provides appropriate safety recommendations to help users make informed decisions. The system uses Decision Tree, Random Forest, and K-Nearest Neighbors (KNN) algorithms to classify the predicted safety risk into Low, Medium, or High categories. Based on the prediction result, the application displays personalized safety recommendations to improve awareness and reduce potential safety threats.***

Traditional women safety methods mainly depend on emergency helplines, manual reporting, and reactive measures, which cannot predict unsafe situations in advance. These approaches often lack intelligent risk analysis and preventive decision-making capabilities. Therefore, there is a need for an intelligent, data-driven, and user-friendly system that can analyze safety-related factors, predict risk levels accurately, and provide preventive safety guidance.

KEYWORDS: Artificial Intelligence (AI), Machine Learning (ML), Women Safety Analytics, Decision Tree, Random Forest, K-Nearest Neighbors (KNN), Risk Prediction, Data Analytics, Flask, Safety Recommendations.

INTRODUCTION

Women's safety has become one of the most important concerns in today's society due to the increasing number of safety threats and crime incidents. With advancements in Artificial Intelligence (AI) and Machine Learning (ML), predictive analytics has become an effective approach for analyzing safety-related data and identifying potential risk levels.

This project combines machine learning techniques with a web-based application to predict women's safety risk based on environmental and location-related factors. The proposed system not only predicts the level of risk but also provides appropriate safety recommendations, helping users make informed decisions and improving personal safety awareness.

LITERATURE SURVEY

Women safety analytics has gained significant attention in recent years due to the increasing need for intelligent systems that can predict and prevent safety threats. Advances **in** Artificial Intelligence (AI)**,** Machine Learning (ML), and Data Analytics have enabled the development of predictive models that analyze environmental and location-based factors to assess safety risks. The core concept of women safety analytics revolves around collecting relevant data, identifying risk patterns, and providing timely safety predictions and recommendations. These intelligent systems assist users in making informed decisions, enhance personal safety awareness, and support authorities in improving public safety through data-driven insights.

RELATED WORK

Several researchers have developed women safety systems using Artificial Intelligence (AI)**,** Machine Learning (ML), and mobile technologies to improve personal security. Earlier systems mainly focused on GPS tracking, emergency SOS alerts, and location sharing, requiring manual user action. Recent research uses machine learning algorithms to analyze factors such as location, time, weather, and crowd density to predict safety risk levels and provide timely safety recommendations, making women's safety systems more intelligent and effective.

EXISTING SYSTEM

The existing women safety systems mainly rely on GPS tracking, emergency SOS buttons, and manual reporting to provide assistance during emergencies. Users must manually trigger alerts or contact emergency services when they feel unsafe. These systems do not predict potential safety risks in advance and offer limited decision support.

Most traditional solutions lack intelligent data analysis and cannot evaluate environmental factors such as location, time, lighting conditions, crowd density, or weather. As a result, they provide reactive rather than proactive protection. Overall, the existing systems lack predictive capabilities, intelligent risk assessment, and personalized safety recommendations.

PROPOSED SYSTEM

The proposed system implements Machine Learning techniques to predict women's safety risk levels based on environmental and location-related factors. It analyzes inputs such as city, area, time of day, lighting score, police station distance, crowd density, and weather conditions to classify the risk as Low, Medium, or High.

The system uses Decision Tree, Random Forest, and K-Nearest Neighbors (KNN) algorithms to provide accurate predictions. Based on the predicted risk level, it displays personalized safety recommendations to help users make informed decisions. The web-based application is developed using Flask, providing a simple, secure, and user-friendly interface for real-time risk prediction and safety awareness.

SYSTEM ARCHITECTURE

The system architecture describes how different components of the Women Safety Analytics system interact to perform risk prediction. It consists of the user interface, application logic, machine learning model, and dataset. The application receives user inputs, processes them through the trained machine learning model, predicts the safety risk level, and displays the corresponding safety recommendations. The architecture ensures efficient data flow, accurate prediction, and a simple, user-friendly working environment.

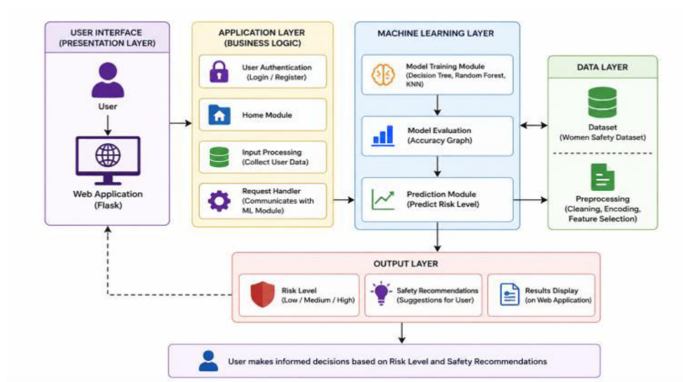

Fig 1: System Architecture

METHODLOGY DESCRIPTION

The methodology of the Women Safety Analytics – Protecting Women from Safety Threats system is designed to predict women's safety risk levels using machine learning. The system collects user inputs, preprocesses the data, and analyzes it using trained machine learning models. Based on the prediction, the system classifies the risk level as Low, Medium, or High and displays suitable safety recommendations through a web-based application. This approach helps users assess safety conditions quickly and supports better decision-making.

RESULTS AND DISCUSSION

Fig2: Login Page of Women Safety Analytics

The **Login Page** serves as the secure entry point to the Women Safety Analytics – Protecting Women from Safety Threats system. It allows authorized users to log in using their credentials and access the application's prediction features. The page is designed with a simple, user-friendly interface to ensure secure and easy access to the system. A successful login redirects the user to the dashboard, while invalid credentials generate an appropriate error message. This ensures that only authenticated users can perform model training and safety prediction.

Fig 3: Home Page

The **Home Page** serves as the main interface of the Women Safety Analytics – Protecting Women from Safety Threats system. It provides users with easy access to features such as model training, prediction, and risk analysis through a simple and user-friendly interface. The page is designed to ensure smooth navigation and quick access to all major functionalities of the application.

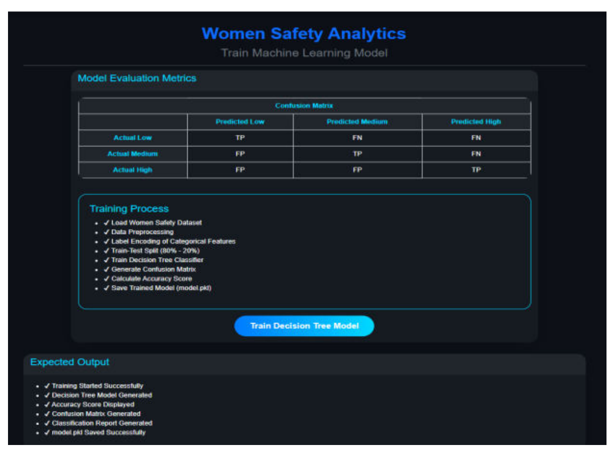

Fig 4: Model Training Page

The **Model Training Page** allows users to initiate the training process of the machine learning model using the women safety dataset. It prepares the data, applies the selected classification algorithm, and trains the model to learn patterns for accurate risk prediction.

Fig 5: Model Evaluation Result Page

The **Model Training Result Page** displays the outcome of the training process after the model has been successfully trained. It presents the accuracy percentage, classification report, and algorithm comparison graph**,** enabling users to analyze the model's performance before proceeding with predictions. It enables users to analyze the strengths and weaknesses of different classification algorithms by presenting their evaluation results in both textual and graphical formats.

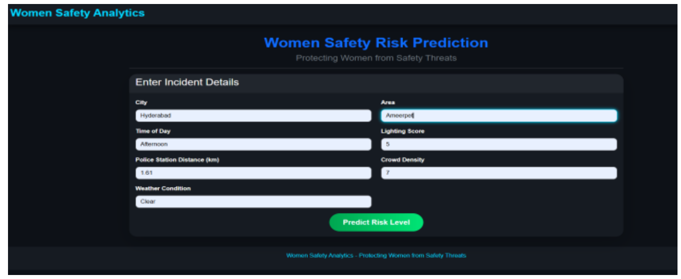

Fig 6: Prediction Page

The **Prediction Page** allows users to enter the required safety-related information for risk analysis. It collects the input data and sends it to the trained machine learning model to predict the women's safety risk level. The page is designed with a simple and user-friendly interface to ensure quick and accurate predictions.

Fig 7: Prediction Result Page

The **Prediction Result Page** displays the predicted women's safety risk level based on the information entered by the user. It presents the prediction result along with personalized safety recommendations according to the identified risk level (Low, Medium, or High). The page helps users understand the safety status and take appropriate precautionary measures.

CONCLUSION

The Women Safety Analytics – Protecting Women from Safety Threats system enhances women's safety by using machine learning to predict safety risk levels based on various environmental factors. By providing accurate risk prediction and personalized safety recommendations, the system helps users make informed decisions and take appropriate precautionary measures. It offers a simple, reliable, and user-friendly solution that promotes awareness and contributes to improving women's personal safety.

FUTURE SCOPE

The proposed Women Safety Analytics system can be enhanced by using advanced machine learning and deep learning models to improve prediction accuracy. Future enhancements may include GPS-based live location tracking, SOS emergency alerts, and a mobile application for real-time safety support. Integration with real-time crime data can further improve risk prediction and provide more accurate safety recommendations.

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