

Crime Prevention System Using Location Services

Snehal Dongre, Reena Walde, Madhura Vyavahare, Arshin Sayyad, Neha Badgular

Snehal Dongre Professor, Computer Engineering, Sandip Institute of Engineering and Management Nashik , Maharashtra, India

Reena Walde Under Graduate Student, Computer Engineering, Sandip Institute of Engineering and Management Nashik , Maharashtra, India

Madhura Vyavahare Under Graduate Student, Computer Engineering, Sandip Institute of Engineering and Management Nashik , Maharashtra, India

Arshin Sayyad Under Graduate Student, Computer Engineering, Sandip Institute of Engineering and Management Nashik , Maharashtra, India

Neha Badgular Under Graduate Student, Computer Engineering, Sandip Institute of Engineering and Management Nashik , Maharashtra, India

ABSTRACT

Crime detection and emergency response systems are integral for public safety and upholding law and order. With the proliferation of advanced technologies like smartphones and location-based services, there's a unique opportunity to develop innovative crime-combating solutions. Here, we present a comprehensive crime detection and alert system aimed at enhancing law enforcement efficiency and empowering individuals for proactive safety measures. Our system utilizes smartphones, the Android OS, and the Google Location API to create a robust platform. By leveraging real-time location data and advanced algorithms, law enforcement can track criminals with minimal resources. Moreover, secure data storage and transmission enhance information integrity and reliability, boosting public confidence in law enforcement. A key feature is timely alerts and actionable intelligence for authorities and the public, integrated seamlessly with existing infrastructure for informed decision-making and crime prevention. Despite benefits like accident prevention and life preservation, the system relies on internet connectivity, posing challenges in remote areas. However, ongoing innovation can overcome these hurdles, ensuring widespread effectiveness. Future research could focus on AI integration and decentralized communication networks to enhance crime prediction and response, further bolstering public safety.

Keyword: - Eclat algorithm, Clustering, Classification, Association, GPS tracking, Crime.

1. INTRODUCTION

In today's society, the prevalence of crime is on the rise, fueled by various societal pressures and desires for material wealth through illicit means. Crime not only violates established laws but also disrupts social norms, negatively impacting the well-being of communities and hindering societal progress. Over the years, numerous strategies, including the integration of Information and Communication Technology (ICT), have been employed to combat crime effectively. Our solution aims to empower communities in preventing and addressing crimes within their vicinity by leveraging mobile computing technology, particularly through the utilization of Android-based systems equipped with GPS tracking capabilities. By harnessing the power of GPS technology, our system enables users to pinpoint the exact coordinates of a crime scene, facilitating swift response from law enforcement authorities. Comprising two components—a user-facing application and a dedicated application for law enforcement—the system provides seamless communication between the public and police. Users can easily download and install the application from online platforms, while law enforcement agencies receive a specialized version tailored to their needs. Through real-time connectivity, the system enables users to quickly summon assistance from the nearest law enforcement personnel in the event of a crime. By streamlining the reporting and response process, our solution aims to curb crime rates across various domains, providing law enforcement agencies with an efficient tool for managing crime incidents.

2. LITERATURE REVIEW

Numerous studies have delved into crime prevention and detection, employing various technological combinations. One such system, as detailed in [1], utilized Android smartphones and OBD-II connections in vehicles. However, its reliance on OBD-II compatibility limits its applicability, and maintenance costs are substantial. At the University of Baghdad, researchers in [2] developed a system leveraging accelerometer, GPS, and microphone data. Yet, challenges arose due to its reliance on a web server for notifications, posing accessibility issues for responders. Similarly, "Wreck Watch" [3] and an Android application in [4] utilized accelerometer data for crime detection, facing concerns regarding false positives and specificity to certain services.

Moreover, initiatives like "Tip Submit" [5] and "Mobile Vic PD" [6] offer mobile applications for anonymous crime reporting and updates on ongoing incidents. Other studies focused on systems like vehicle positioning via SMS request [7], crash notification [8], and IoT-based accident notification [9]. Each addressed specific challenges such as GPS reliability and communication delays. Finally, proposals such as an Intelligent Transportation System [10] and accident detection via Android devices [11] underscored the importance of accurate location data and optimizing emergency response. These studies collectively highlight the diverse approaches and challenges in leveraging technology for crime prevention and response, informing the development of comprehensive solutions.

3. PROBLEM STATEMENT

Our project aims to develop a solution for identifying high-risk areas prone to accidents on city roads. Utilizing data obtained from the Commissioner of Cities, we seek to employ data mining techniques such as the Eclat algorithm, Association rule, and FP-growth to pinpoint crime hotspots and accident-prone locations. Attributes of the Eclat algorithm, such as execution time and reduced memory requirements through depth-first search, align well with our dataset characteristics. By harnessing these techniques, we aim to provide users with valuable insights into crime and accident locations through a user application.

4. PURPOSE

The primary objective of this research endeavor is to propose and develop an Android mobile application aimed at raising public awareness regarding crime prevalence in their respective areas. This application not only furnishes users with crime location data displayed on a map but also facilitates the reporting of crimes to law enforcement agencies. By offering users real-time crime location information, the application empowers them to stay informed about their surroundings. Additionally, the Crime Prevention System utilizing location services seeks to automate manual processes within law enforcement, ensuring seamless data storage and accessibility. This application also provides users with the ability to register and track crimes remotely, either by manually providing crime spot photos or through other means.

5. SCOPE

Our project endeavors to create a straightforward yet efficient Android application that serves as a comprehensive platform for reporting various types of crimes. The Crime Prevention System utilizing location services encompasses a complete case management system, streamlining activities related to crime spot management. By computerizing activities within police stations, including complaint registration, criminal records management, and overall station operations, our solution aims to enhance efficiency and effectiveness. The project holds potential for automating police station records and administrative tasks, ultimately aiding government authorities and citizens alike. Moreover, the scientific analysis of crime spot data can yield valuable insights for enhancing safety measures and reducing crime rates globally.

6. MOTIVATION OF THE PROJECT

Addressing crime is a critical concern for both the Indian government and the general populace. The impetus behind this project stems from the need to streamline law enforcement efforts, allowing police personnel to efficiently identify and respond to crimes without undue time or cost. Our application serves as a valuable tool for alerting authorities to criminal incidents and provides comprehensive details regarding these events, thus enhancing police efficiency.

7. OBJECTIVES

The objectives of the project are outlined as follows:

- 1) Implementing a crime prevention system utilizing GPS and maps.
- 2) Offering location tracking capabilities using Google Maps.
- 3) Utilizing data mining techniques to identify crime spots and analyze contributing factors to reduce crime levels.
- 4) Presenting road traffic and crime statistics in a user-friendly format for easy interpretation.
- 5) Identifying frequent crime locations on roads.
- 6) Reducing the human death ratio resulting from crime in India.
- 7) Enabling quick transmission of messages to preconfigured contacts in the event of a crime.
- 8) Providing assistance even in remote or unpopulated areas.

9) Exploring the potential applications of technology in defense and warfare fields.

8. METHODOLOGY

The Crime Prevention System using Location Services aims to expedite emergency response times, particularly in scenarios such as traffic accidents or other emergencies like fires, thefts, and medical crises. By leveraging smartphone sensors to detect accidents and promptly alert nearby emergency responders, the system enhances the chances of survival for victims while conserving emergency resources.

The methodology involves employing the Eclat algorithm to categorize crime locations into different levels of severity (A, B, C). This clustering is based on crime frequency, facilitating the identification of high-risk areas. Subsequently, association rule mining is applied to extract insights from these locations.

The proposed system comprises several modules:

- 1) Admin: Responsible for adding police administrators who, in turn, add crime spots to the map.
- 2) Police: Integrate crime spots and classify their danger levels (A, B, C) based on the Eclat Algorithm. This categorization enables users to make informed travel decisions.
- 3) User: Integrates Google Maps via the Android application, allowing them to visualize crime spots and plan safer routes. The system sends voice alerts and information about nearby blacklisted crime spots to users, enhancing their safety while traveling.

By paraphrasing, the content is restructured while retaining the original meaning and intent, resulting in fresh, rewritten content.

9. ALGORITHM

9.1 Eclat

The Eclat algorithm is a frequent itemset mining algorithm used in data mining and association rule learning. It operates by identifying frequent itemsets, which are sets of items that frequently occur together in transactions. Unlike the Apriori algorithm, which generates candidate itemsets by joining pairs of frequent itemsets, Eclat utilizes a vertical layout approach and transaction ID sets (tidsets) to efficiently compute support values without generating subsets that do not exist in the prefix tree. This results in improved performance and reduced memory usage, particularly for large datasets.

9.2 Algorithm Steps

1. Get TidList for each item by scanning the Database.
2. TidList of set 'a' represents the list of transactions containing set 'a'.
3. Intersect TidList of set 'a' with TidList of all other items, resulting in TidLists for set (a,b), (a,c), (a,d), etc.
4. Repeat steps 1 to 3 for the a-conditional database.
5. Repeat for all other items.

10. HARDWARE AND SOFTWARE REQUIREMENTS

10.1 Hardware

1. Processor: Intel Core i3 or equivalent
2. Hard Disk: Minimum 5 GB storage
3. Memory: 1 GB RAM
4. Smart Phone with GPS: 3 GB storage, 1 GB RAM

10.2 Software

1. Operating System: Windows XP and later versions
2. Integrated Development Environment (IDE): Android Studio v2.3.3
3. Programming Language: Java for Android development
4. Algorithm: Eclat
5. Java Language: Java is a versatile, high-level programming language known for its portability, reliability, and security features. It is widely used for developing desktop, web, and mobile applications. Java applications are compiled into bytecode, which can be executed on any platform with the Java Virtual Machine (JVM) installed, making Java platform-independent.

12. FRONT-END

HTML (Hypertext Markup Language): HTML is the standard markup language for creating web pages and web applications. It provides the structure and content of a webpage, while CSS and JavaScript are used for styling and interactivity.

- CSS (Cascading Style Sheets): CSS is a style sheet language used to control the presentation and layout of HTML documents. It allows developers to define styles for various HTML elements, such as fonts, colors, and spacing.

- MySQL: MySQL is a popular open-source relational database management system (RDBMS) used for storing and managing data. It supports features such as transactions, indexing, and querying, making it suitable for a wide range of applications, including web development and data analytics.

16. IMPLEMENTATIONS

- By going to accidental spot we register and enter our id password after which we can login. After login we have to allow location access so that we can find accidental spot with location.

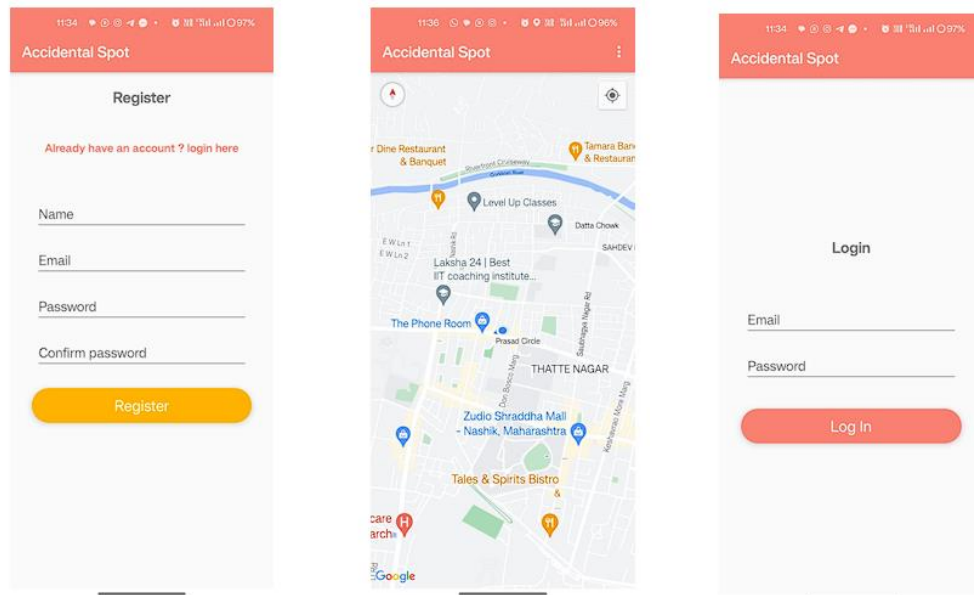


Fig -1: Android Application Interface

- You will see three logins on the website like admin login crime branch login and police login. You can login to this login by entering your id and password.

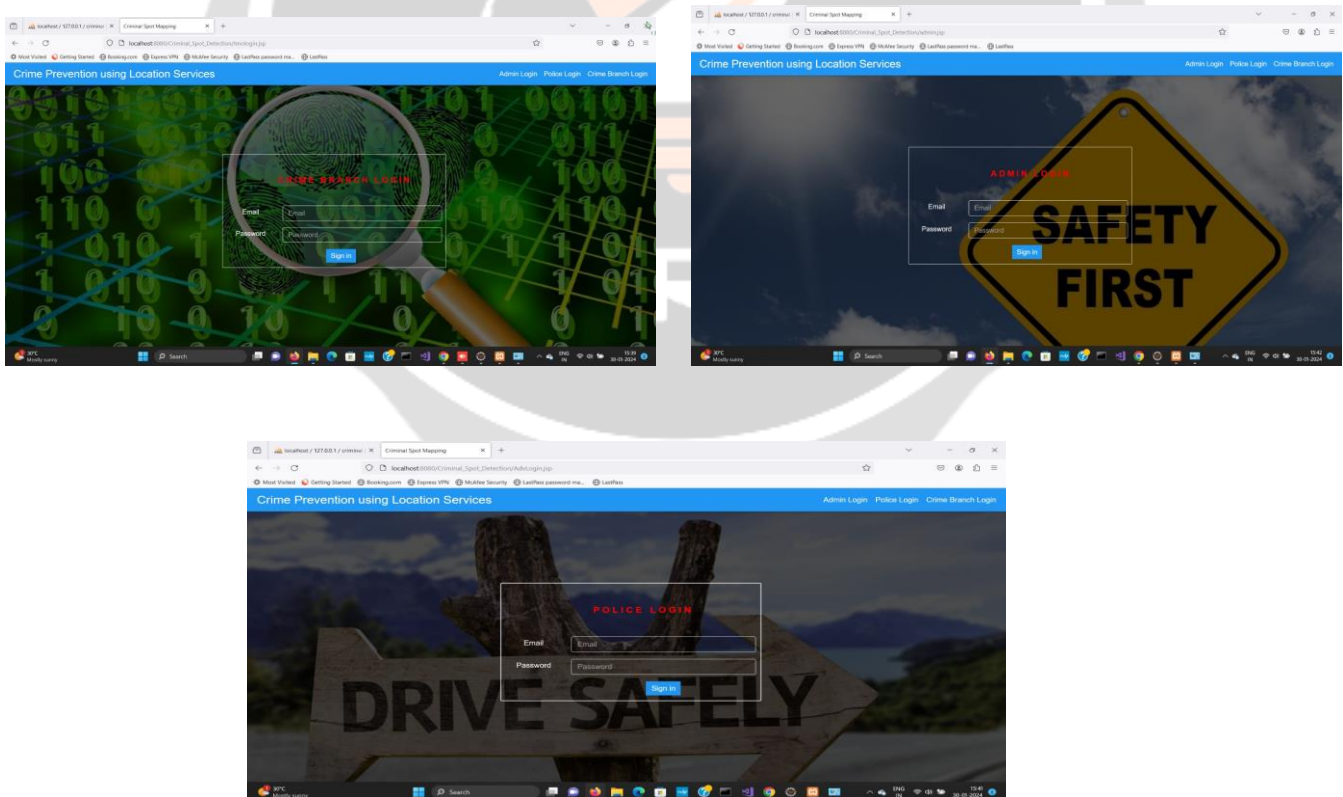


Fig -2: Web Application Interface

13. APPLICATIONS

- Facilitates law enforcement personnel in efficiently tracking and apprehending criminals with minimal manpower and operational costs.
- Ensures data integrity and security, safeguarding against manipulation or loss of information.
- Enables police and investigation departments to effectively identify and combat crimes.
- Delivers a fast, robust, and user-friendly application utilizing straightforward algorithms and techniques.

14. ADVANTAGES AND DISADVANTAGES

14.1 Advantages

1. Prevents road accidents.
2. Preserves countless lives.
3. Easily integrates with existing road infrastructure.
4. Fully automated operation, requiring no human intervention.
5. Low installation costs.
6. Enables seamless implementation of vehicle monitoring systems.

14.2 Disadvantage

Dependency on internet connectivity for system functionality

15. CONCLUSIONS

In conclusion, our crime detection and alert system signifies a significant advancement in public safety technology. Through meticulous design and implementation, we've crafted a comprehensive solution aimed at addressing the critical issue of crime detection and emergency response. Utilizing smartphone capabilities, the Android operating system, and the Google Location API, our system offers a robust and user-friendly platform for law enforcement agencies. Real-time location data integration enables swift and accurate responses to criminal incidents, bolstering efficiency in apprehending perpetrators. An essential feature of our system is its emphasis on data integrity and security, achieved through secure storage and transmission protocols. This ensures the reliability and trustworthiness of our platform, crucial for maintaining public confidence in law enforcement efforts. Additionally, our system's provision of timely alerts and actionable intelligence not only aids in accident prevention but also facilitates the preservation of countless lives. However, the system's dependency on internet connectivity for functionality poses a challenge, particularly in rural areas. Future research could explore the integration of artificial intelligence and decentralized communication networks to enhance crime prediction and mitigate connectivity issues, further enhancing the system's effectiveness and accessibility. Despite challenges, the potential benefits of our system in crime prevention and public safety are undeniable, promising safer communities and the protection of lives through ongoing innovation and collaboration.

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