

**VIVEKANAND EDUCATION SOCIETY'S
INSTITUTE OF TECHNOLOGY**

Department of Computer Engineering



Project Report on

Agati - A Personalized Women's Safety and Empowerment App

In partial fulfillment of the Fourth Year (Semester-VII), Bachelor of Engineering
(B.E.) Degree in Computer Engineering at the University of Mumbai

Academic Year 2024-2025

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(2024-25)

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Certificate of Approval

This is to certify that **Dhruv Aswani (1), Praful Pradhan(40), Aman Sande(46), Rajveer Tolani (57)** of Fourth Year Computer Engineering studying under the University of Mumbai has satisfactorily presented the project on "**Agati - A Personalized Women's Safety and Empowerment App**" as a part of the coursework of PROJECT-I for Semester-VII under the guidance of **Prof. Mrs. Pallavi Saindane** in the year 2024-2025.

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We wish to express our profound thanks to all those who helped us in gathering information about the project. Our families too have provided moral support and encouragement several times.

Computer Engineering Department

COURSE OUTCOMES FOR B.E PROJECT

Learners will be to:-

Course Outcome	Description of the Course Outcome
CO1	Do literature survey/industrial visit and identify the problem of the selected project topic.
CO2	Apply basic engineering fundamental in the domain of practical applications FORproblem identification, formulation and solution
CO3	Attempt & Design a problem solution in a right approach to complex problems
CO4	Cultivate the habit of working in a team
CO5	Correlate the theoretical and experimental/simulations results and draw the proper inferences
CO6	Demonstrate the knowledge, skills and attitudes of a professional engineer & Prepare report as per the standard guidelines.

ABSTRACT

In an era marked by technological innovation and social progress, empowering women in rural areas stands as an essential and compelling mission. Agati is a transformative digital platform designed to address multifaceted challenges faced by women in rural communities. This application emerges as a beacon of hope and progress, aiming to elevate women's lives in rural areas by fostering both safety and entrepreneurship.

The app's primary objectives encompass enhancing women's safety, promoting financial independence, and nurturing a supportive community. It offers a comprehensive suite of features, including safety tools for immediate assistance, webinars/seminars to build skills, and entrepreneurial support for economic empowerment. Moreover, it fosters a sense of community where women can connect, share experiences, and inspire one another to chase their dreams.

With data-driven insights and local partnerships, our Women's Safety and Entrepreneurship Application ensures that it aligns with the unique needs and cultural contexts of each community it serves. Its sustainability plan secures its long-term impact and fosters lasting improvements in women's lives. This application represents a catalyst for change, a digital ally in the journey towards gender equality and inclusive development. Through it, women in rural areas can shed limitations, break barriers, and become the architects of their destinies. It's not just an app; it's a movement.

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Chapter 1: Introduction

1.1 Introduction

In a world where safety and empowerment should be fundamental rights, we recognize that women often face unique challenges. Our project aims to address these challenges head-on, with a focus on harnessing technology for positive change. In this project, we will build an innovative app, "Agati," which is not just an app but a movement towards a safer, more equitable future for women everywhere. We believe that every woman should have the tools and resources to live a life free from fear and full of opportunity. With Agati, we are not only providing a sense of security but also fostering empowerment by leveraging technology, community, and support. Together, we can create a world where women can thrive, lead, and inspire without limitations.

1.2 Motivation

Creating an application that promotes women's safety and entrepreneurship in rural areas is a remarkable endeavor that can bring about profound change. Our vision is not just a technological innovation; it's a beacon of hope and progress. By dedicating our energy and resources to this noble cause, we're not only developing a digital solution but also forging a path towards a more equitable society. In our hands, we hold the power to provide women in rural areas with the tools they need to feel safe, gain financial independence, and become architects of their own destinies. This project is not just about lines of code; it's about breaking barriers and shattering glass ceilings. Our determination, compassion, and commitment will pave the way for countless women to transcend limitations, unlock their potential, and shine as beacons of resilience and entrepreneurship. Stay inspired, for we are crafting a brighter future for women in rural areas, and our journey will undoubtedly inspire others to join the cause. Together, we can make a lasting impact on the world. Keep pushing forward with our remarkable vision, and let our dedication be the driving force behind this transformative endeavor.

1.3. Problem Definition

In the realm of women's safety and empowerment, there is a pressing need for a comprehensive mobile application that not only provides personal safety tools but also fosters community engagement, financial literacy, and access to resources. The objective is to develop an all-encompassing app that addresses these needs by incorporating advanced features such as real-time location tracking, dynamic event recommendations, and direct access to government schemes and loans. The app should also offer seamless communication between entrepreneurs and users, empowering women through knowledge sharing and direct mentorship.

The problem is twofold:

1. **Safety Tools and Real-time Assistance:** While many safety apps exist, there is a lack of integration between personal safety tools like SOS contacts, fake calls, and location tracking. Users need a reliable, easy-to-use solution that provides real-time assistance, such as police station locators and geofencing alerts.
2. **Community Engagement and Empowerment:** Women entrepreneurs and learners need a platform that facilitates direct communication, event participation, and financial empowerment. Event recommendations, knowledge sharing via a Q&A section, and access to government schemes and loans are essential features for fostering a community of empowered women.

To address these challenges, the app will feature:

- **Machine Learning for Event Recommendations:** A recommendation system that suggests relevant empowerment events based on user preferences and past interactions.
- **Web Scraping for Dynamic Content:** Integration of web scraping to dynamically gather and display information about the latest government schemes and loans.
- **Chatbot for Guidance:** A chatbot that assists users in navigating the app and provides real-time information about available schemes and features.

By integrating these components, the app aims to offer a holistic solution that empowers women with both personal safety tools and opportunities for growth, learning, and financial independence.

1.4 Relevance of the Project

The relevance of your project lies in addressing multiple aspects of safety, empowerment, and accessibility, especially for women, while integrating modern technology to enhance user experience. Here's why it stands out:

1. **Safety and Security:** Tools like fake calls, SOS contacts, and location tracking via SMS offer immediate safety options, which are critical for personal security in real-life emergencies.
2. **Real-Time Assistance:** The police station locator provides real-time assistance, which is a practical and important feature for users in distress or unfamiliar situations.
3. **Women Empowerment:** By organizing and recommending events related to entrepreneurship and empowerment, your app fosters community building and personal growth. The direct connection to X (Twitter) helps spread awareness about these events, increasing outreach.

4. **User Engagement:** The payment gateway, shared Q&A, and video conferencing create a collaborative platform for entrepreneurs and learners, making the app not just a safety tool but also an educational and community-driven platform.
5. **Machine Learning Integration:** The event recommendation system adds a personalized touch, improving user satisfaction by tailoring suggestions based on their preferences and past behavior.
6. **Access to Government Schemes:** Scraping dynamic content like schemes and loan information allows users to stay informed about relevant opportunities, particularly in areas like finance and empowerment, which can positively impact their lives.
7. **Chatbot for Guidance:** The chatbot simplifies app navigation, enhances accessibility, and serves as a virtual assistant to guide users, helping them better engage with the app's features and stay informed.

This combination of safety, empowerment, community engagement, and the use of cutting-edge technology makes your app highly relevant in today's context, especially for empowering women and fostering personal growth through technology.

1.5 Methodology Used

For the methodology specifically related to **ML model**, **web scraping**, and **chatbot** development in your app, here's a breakdown:

1. Machine Learning Model (Event Recommendation System)

Requirement Analysis:

- **Goal:** Develop a recommendation system to suggest relevant events based on user preferences, past behavior, or event popularity.
- **Data Collection:** Gather data like user profiles, event preferences, user-event interaction history (e.g., events attended, likes), and event metadata (type, category, location).

Data Preprocessing:

- **Data Cleaning:** Handle missing values, inconsistent data, and duplicates in the event/user datasets.
- **Feature Engineering:** Extract relevant features like event categories, user interests, and geographical preferences.
- **Normalization:** Apply scaling or normalization to the features, if necessary.

Model Selection:

- **Algorithm Choice:**

- **Collaborative Filtering:** To recommend events based on user similarity and past interactions.
- **Content-Based Filtering:** To recommend events based on the attributes of the events (e.g., categories) that match the user profile.
- **Hybrid Model:** Combining collaborative filtering and content-based filtering for better accuracy.

Model Training:

- **Model Training:** Use techniques such as:
 - **Matrix Factorization (e.g., SVD):** To find hidden patterns in user-event interactions.
 - **k-NN (k-Nearest Neighbors):** To compute similarities between users based on event preferences.
 - Use libraries like TensorFlow, Scikit-learn, or PyTorch for training and evaluation.

Evaluation:

- **Metrics:** Evaluate model performance using metrics like precision, recall, F1-score, and mean squared error (for rating predictions).
- **Cross-validation:** Perform k-fold cross-validation to ensure model robustness.

2. Web Scraping (Latest Government Schemes and Loans)

Requirement Analysis:

- **Goal:** Scrape dynamic content like government schemes, loan information, and financial assistance programs to keep users informed.

Tool Selection:

- **Libraries:** Use Python-based tools such as:
 - **BeautifulSoup:** For parsing HTML and extracting relevant content.
 - **Scrapy:** For building robust, scalable scrapers that can crawl multiple pages.
 - **Selenium:** For scraping websites that load content dynamically with JavaScript.

Scraping Process:

- **Target Websites:** Identify trusted sources such as government portals, financial institutions, or public databases that provide updates on schemes.
- **Data Extraction:**

- Define rules to scrape specific sections of the webpage, such as tables, headlines, and links.
- Handle pagination or dynamic content loading using Selenium if necessary.

Data Cleaning & Transformation:

- **Data Cleaning:** Process raw HTML data to remove noise (e.g., advertisements, navigation menus) and extract meaningful content.
- **Transformation:** Convert the scraped data into a structured format (e.g., JSON, CSV) to store in a database like Firebase or SQLite.

Scheduling:

- **Automated Updates:** Schedule periodic scraping jobs using cron jobs or task schedulers to keep the content up-to-date.
- **Compliance:** Ensure compliance with legal and ethical standards by checking the terms of service of the websites you scrape.

Integration:

- **Display in App:** Store the scraped data in Firebase or SQLite and dynamically render it in the app using Kotlin, ensuring users get the latest information on government schemes.

3. Chatbot Development (Guiding Users and Providing Scheme Information)

Requirement Analysis:

- **Goal:** Develop a chatbot that can assist users in navigating the app, finding relevant features, and answering queries about government schemes and loans.

Platform Selection:

- **Tools:**
 - **Dialog Flow:** A Google-powered platform that integrates well with Firebase and offers natural language processing (NLP) capabilities.
 - **Rasa:** An open-source alternative for developing more customizable chatbot solutions with advanced NLP features.
 - **TensorFlow:** For building a custom chatbot with deep learning-based NLP if needed.

Dialog Management:

- **Conversation Flows:** Design conversation flows for various scenarios like guiding users, providing event details, answering FAQs about schemes, and offering step-by-step instructions.
- **Action Handling:** For tasks that require interaction with external APIs (like querying events or government schemes), implement logic in the chatbot to fetch data in real-time.

Deployment:

- **App Integration:** Integrate the chatbot into the app using a Kotlin-based interface, allowing users to interact with it directly.
- **Real-time Interaction:** Use Firebase or a cloud service to handle user inputs and provide immediate responses.

Continuous Learning:

- **Feedback Loop:** Collect user feedback on chatbot responses to retrain and fine-tune the NLP model over time, ensuring better accuracy and interaction quality.

Monitoring:

- **Performance Tracking:** Monitor chatbot performance using metrics like user satisfaction, response time, and query accuracy. Continuously improve based on feedback and interaction logs.

This methodology breaks down the development and integration of the **ML recommendation system**, **web scraping**, and **chatbot** into structured phases. It ensures smooth deployment and real-time interaction while keeping the app up-to-date with dynamic information and personalized features.

Chapter 2: Literature Survey

2.1 Research Papers Referred

1] Women Safety App [4]

Abstract: In today's world, people using smartphones have increased rapidly and hence, a smart phone can be used efficiently for private security or various protection purposes hence, a smart phone can be used efficiently for private security or various other protection purposes. The dangerous incidents that outraged the entire other protection purposes. The heinous incidents that outraged the entire nation have woken us to go for safety issues. So we have created an app so that women can feel safe when they go outside. The feature of this application is to send the message to the registered contacts continuously, i.e. sharing the message to the registered contacts continuously and sharing the live location. Continuous location tracking information helps to seek out the location, tracking information helps to find the location of the victim and can be rescued safely.

Inference - The proposed system is based on gps, It consists of GPS devices i.e. any Android Phone. The device will provide the location information to the contacts The system which is proposed is based on advanced sensors. Whenever the user shakes the phone, a distress signal will be sent to the contacts which are added in the emergency contacts list and call to the main person in the contact. It has an SOS emergency list and when the user presses the power button 5 times then emergency mode gets activated and a message is sent to the contact list. Apart from this also the contact number of the nearest police station and hospital will be accessed. However, keeping the power button as the trigger to many actions may cause ambiguity if the power button is pressed 5 times by mistake . This is a major drawback.

2] INTELLIGENT WOMEN SAFETY APP [7]

Abstract: Women safety has been a big concern and it has been the most important obligation of every person. There is no possibility of the welfare of the world unless the condition of women is improved. Since ancient times, women have been given the most respected place in society but every day and every minute some women of all walks of life (women, girls and babies) are getting harassed, molested, assaulted and violated at different places all over the world. It is estimated that 35% of the women have experienced physical and/or sexual violence at some point in their lives. This paper includes various ideologies and methodologies of numerous authors who have reviewed multiple applications and devices using present technologies and processors and they have also upgraded these with firm requirements in order to decrease violence against

women. Also a petite measure of improvement proposed in this paper, adds to the better performance of these devices and leads to better women safety.

Inference - This application has its three phases of working which is described below:

The first step will be to register herself and then register important contact numbers in the application. Once you register yourself on the application, also add important contact members in the application. When someone is in danger it will take the data from the database and do all the important operations. The second phase of this application is sending information through GPS and Bluetooth. Like through GPS the victim's location will be sent to the registered contact members. And using Bluetooth it will send the important information also via Bluetooth in the range of Bluetooth. The third phase of this application is to send messages to the registered contact members. As we are using time intervals like 5 minutes or 10 minutes after every interval of 5-10 minutes again messages will be sent to the registered contact numbers so that if in time, the receiver does not receive the message then they can try to save the victim. Here a major drawback is that if the phone's battery is dead then the receiver will not receive the message and due to that a lot of ambiguity can occur.

3] Women Safety App [9]

Abstract: Crime control, public security especially women security are serious concerns for any country around the world. Police and various intelligence agencies constantly work for the same. Despite constant efforts, patrolling and using different types of technologies, equipment and methods like CCTV surveillance regularly, aerial inspection through simple camera drones (for serious cases) to control the crime, a significant change could not be observed. Moreover, Women protection is still a serious issue in various countries like India. Gender ideologies in India have seen an improving sign among all people within the society in upbringing the social status of women in different workplaces and environments but the status of women security remains the same or has been worsened. So we develop a system to find the safest path for the woman while she is going outdoors alone. And also we provide safety to that women when she is in the trouble or in the helpless condition , she can also notify the situation to the family members or to the nearest police stations

Inference - To develop a system for android users for keeping track through several applications. This application uses GPS for identifying the location of the person in trouble and the system can be divided into two modules: 1. First module can be the victim's phone i.e the root device which uses 3G/2G data connection for tracking the location of the victim through GPS. 2. Second module can be the mobile phone of registered contacts either police or friends or family members, which receives the message containing the URL of location of victim that is sent from the root device. when we click on the app, it first checks whether the location settings, data connection settings in the application are on or not. Then, it tracks the location of the victim via GPS and

sends these location coordinates in the form of URL through message to the registered contacts. Here, registered contacts means the contact details that are saved in the application during its initialization. Now, at the received device, by clicking on the URL in the message, it spots the exact location of the victim. Also, as the message containing the victim's location is sent for every five minutes from the root device, the victim can be tracked wherever she goes and can be rescued safely and quickly. However, in the first module, if the network signal is weak, then there may be delay in the message or the data may not be accurate.

4] A case study for intelligent event recommendation

Abstract: The paper presents a case study on developing an intelligent event recommendation system that combines content-based filtering with collaborative filtering techniques.

Inference: The study demonstrates that integrating contextual information with traditional recommendation techniques significantly improves the personalization and effectiveness of event suggestions.

5] Personalized Event Recommendations for Smart Event-Based Social Networks

Abstract: The paper introduces EventRec, a personalized event recommendation system for smart event-based social networks that leverages both user preferences and contextual factors like time and location.

Inference: EventRec's emphasis on combining user preferences with real-time contextual data is crucial for creating dynamic and relevant event recommendations, which can be effectively applied to enhance user experience in women's empowerment and safety apps.

2.2 Limitation Existing system or Research gap

1. Limited Accessibility: Some women empowerment apps may not be accessible to women in rural or remote areas with limited internet connectivity or smartphones. Bridging the digital divide is essential.
2. Language and Cultural Sensitivity: Many apps may not cater to diverse linguistic and cultural backgrounds, making them less effective for a broad audience.
3. Lack of Comprehensive Resources: Some apps may focus on a single aspect of empowerment, such as financial literacy or self-defense, but fail to provide a comprehensive range of resources that women need to thrive.
4. Privacy Concerns: In apps that collect personal information, there might be concerns about data privacy and security, which can deter women from using them.

5. Safety and Security Features: While some apps may provide information and resources, they might not have robust safety and security features, such as emergency response mechanisms.
6. Customization and Personalization: Lack of customization options can hinder user engagement. Women have different needs and preferences, and apps should cater to these individual differences.
7. Feedback Mechanisms: Some apps may not have effective feedback mechanisms for users to provide input or report issues, limiting their ability to improve and adapt.
8. Sustainability: The long-term sustainability of empowerment apps can be a challenge. They may rely on funding that can be unpredictable, affecting their continuity.

Chapter 3: Requirements for the proposed system

3.1 Functional Requirements

Functional requirements define what the system should do, describing specific behaviors and functionalities expected from the women's safety app.

These requirements outline actions the app should perform, such as : sending emergency alerts:

- Providing real-time location tracking.
- Facilitating communication with emergency contacts.
- Offering access to resources like helplines or support services.
- Different entrepreneurs can host events on our app.
- Women can attend those events.

Functional requirements are typically documented through user stories, use cases, or feature lists to ensure clarity and alignment with user needs.

3.2 Non-Functional Requirements

Non-functional requirements specify the quality attributes or constraints that the system must meet, beyond its basic functionalities.

These requirements address aspects such as performance, reliability, usability, security, scalability, and compliance with regulations or standards.

Non-functional requirements ensure that the app not only functions correctly but also delivers a satisfactory user experience while meeting industry standards and legal obligations.

3.3 Constraints

Constraints refer to limitations or restrictions that may impact the design, development, or deployment of the women's safety app.

These constraints could include budgetary constraints, time limitations, hardware limitations (e.g., device compatibility), software compatibility requirements, regulatory constraints, or organizational policies.

Identifying and documenting constraints upfront helps project stakeholders understand potential challenges and plan accordingly to mitigate risks and ensure project success.

When developing a women's safety and inclusivity app, several constraints may come into play. Here are some key considerations:

1. Technical Constraints:

- **Internet Connectivity:** Users may have varying levels of internet access, impacting features like real-time location sharing..

2. **Privacy and Security:**
 - **Data Protection:** Safeguarding users' personal information is crucial, especially in sensitive situations
3. **User Experience:**
 - **Accessibility:** The app should be user-friendly for individuals with varying tech literacy levels and disabilities.
4. **Resource Constraints:**
 - **Funding:** Limited budget for development, marketing, and maintenance can restrict features and outreach.
 - **Expertise:** Need for input from safety experts, social workers, and legal advisors may be constrained by availability and budget.
5. **Community Engagement:**
 - **User Adoption:** Building trust and encouraging use in various communities, particularly in areas where safety concerns are high.
 - **Feedback Mechanisms:** Establishing effective ways to gather user feedback and iterate on the app based on real experiences.
6. **Partnerships:**
 - **Collaboration with NGOs/Authorities:** Limited ability to partner with local organizations or authorities can affect the app's reach and effectiveness.
7. **Cultural Constraints:**
 - **Social Norms and Stigma:** Addressing societal attitudes towards women's safety and reporting incidents may influence app usage and acceptance.

By addressing these constraints, developers can create a more effective and user-centered women's safety and inclusivity app.

3.4 Hardware & Software Requirements

Hardware : Laptop, Internet.

Software : Jetpack Compose, Firebase, SQLite.

Technology : Application Development, Machine Learning.

Tools Utilized : Android Studio, Firebase Console, Colab.

3.5. Techniques utilized till date for the proposed system

To date, several key techniques and technologies have been employed in the development of the proposed women's empowerment and safety app. These techniques ensure the app's functionality, reliability, and user-centered design:

1. Kotlin and Jetpack Compose for Frontend Development:

The app is being developed using Kotlin, a modern and efficient programming language for Android development. Jetpack Compose, a declarative UI framework, is utilized to

create a responsive, dynamic, and easy-to-use user interface, ensuring a seamless experience across different Android devices.

2. Firebase for Backend Integration:

Firebase is used for user authentication, real-time database management, and cloud storage. It ensures secure login and data storage, supporting features like SOS contacts, location tracking, and event information. Firebase's Firestore database also enables real-time updates, keeping the app responsive and current.

3. SQLite for Local Data Storage:

SQLite is implemented for offline data storage to ensure that critical features such as SOS contacts, user profiles, and event bookmarks are available even without internet connectivity.

4. Geolocation Services and SMS-Based Location Tracking:

The app leverages Android's geolocation APIs and SMS services for real-time location tracking, ensuring that a user's location can be shared with trusted contacts during emergencies. This feature works via SMS to ensure functionality even when mobile data is unavailable.

5. Dynamic Police Station Locator:

A dynamic location-based service has been integrated into the app, allowing users to locate the nearest police station for immediate assistance. This utilizes real-time geospatial data to provide accurate and timely results.

6. Payment Gateway Integration:

A secure payment gateway has been integrated into the app to allow users to book seats for events and webinars. This ensures smooth, secure financial transactions within the app, enabling users to access premium features and services.

7. Real-Time Social Media Integration (X - Twitter):

The app is connected to X (formerly Twitter) to instantly tweet information about any upcoming events. This keeps the community informed and engaged through real-time social media integration.

These technologies and techniques collectively form the backbone of the proposed system, ensuring it is scalable, user-friendly, and effective in meeting the dual goals of women's safety and empowerment.

3.6. Tools utilized till date for the proposed system

The development of the proposed women's empowerment and safety app has involved the use of a wide range of tools to ensure seamless integration, functionality, and scalability. These tools support both the technical and operational aspects of the system:

1. Android Studio:

Android Studio is the primary Integrated Development Environment (IDE) used for

developing the app. It provides robust support for Kotlin, Jetpack Compose, and Android development tools, ensuring efficient code management, debugging, and deployment of the app.

2. Kotlin:

Kotlin is the programming language used for building the app. Its concise syntax, interoperability with Java, and Android-native features make it ideal for creating a responsive and efficient application.

3. Jetpack Compose:

Jetpack Compose is the modern UI toolkit used for designing the app's user interface. It simplifies UI development with less code, improved reusability, and a reactive programming model, making it easier to create dynamic and visually appealing layouts.

4. Firebase:

Firebase is a key tool for backend services, providing authentication, real-time database, cloud functions, and storage. It handles user login, data syncing, and event management, ensuring smooth and secure cloud-based operations for the app.

5. SQLite:

SQLite is used for local data storage, ensuring users have offline access to important features like saved contacts, event information, and app settings. It is lightweight and efficient for storing structured data on the user's device.

6. X (Twitter) API:

The X (formerly Twitter) API is utilized to automate tweets related to events and updates. This integration allows the app to instantly notify followers about new events, fostering community engagement through social media.

7. Razorpay (Payment Gateway):

Razorpay has been integrated as the payment gateway to facilitate secure transactions for seat bookings, event payments, and other financial activities within the app.

8. GitHub:

GitHub is used for version control and collaboration, ensuring smooth management of code changes, feature integration, and team collaboration throughout the development process.

These tools collectively support the app's front-end and back-end functionality, ensuring a secure, scalable, and user-friendly experience for the app's users.

3.7. Algorithms utilized in the existing systems

The development of the proposed women's empowerment and safety app has employed various algorithms to handle tasks related to event recommendation, location tracking, and real-time assistance. These algorithms ensure that the app delivers a personalized, secure, and efficient user experience.

1. Collaborative Filtering for Event Recommendation:

The app employs collaborative filtering techniques for personalized event recommendations. This algorithm analyzes user behavior, such as event participation history and preferences, to suggest relevant future events. By identifying patterns in user interactions, it provides tailored recommendations, increasing user engagement.

2. K-Nearest Neighbors (KNN) for Location-Based Services:

KNN is used in the dynamic police station locator feature to find the nearest police stations based on a user's current geolocation. The algorithm calculates the distances between the user's location and multiple police stations, selecting the closest ones to provide real-time assistance.

3. SMS-Based Location Sharing Algorithm:

The app uses a custom algorithm to send location details via SMS to emergency contacts. This algorithm ensures that the user's coordinates are accurately captured and sent even when mobile data is not available, enhancing reliability in emergency situations.

4. Natural Language Processing (NLP) for Chatbot:

The chatbot leverages NLP algorithms to understand and interpret user inputs. This enables the bot to process natural language queries and provide relevant responses about app navigation, government schemes, and other features. The NLP techniques used include tokenization, intent recognition, and entity extraction.

5. Hierarchical Clustering for User Grouping:

To improve event recommendations and facilitate community engagement, hierarchical clustering is used to group users based on their behavior, interests, and preferences. This grouping helps provide more accurate event recommendations and tailor content for specific user segments.

6. Encryption Algorithms for Data Security:

Advanced encryption algorithms like AES (Advanced Encryption Standard) are utilized to secure sensitive user data, including personal information, location data, and payment details. This ensures that all communication between the app and the backend is encrypted, protecting user privacy.

7. Razorpay API's Fraud Detection Algorithms:

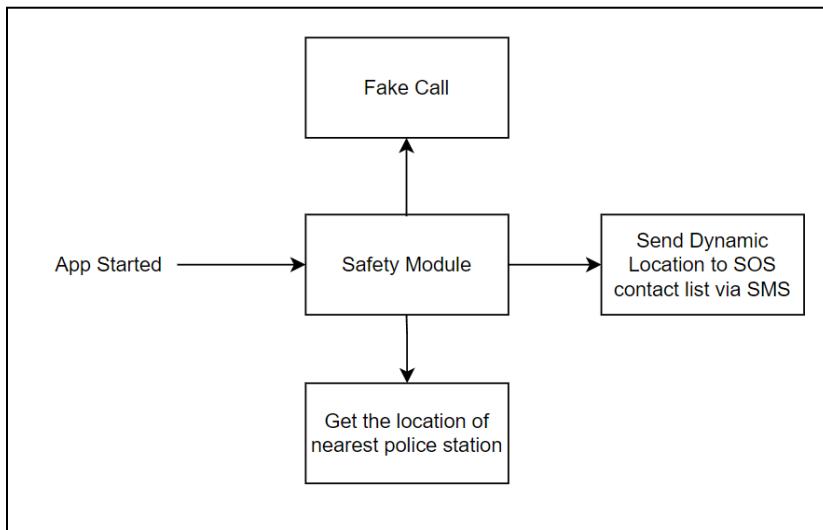
The Razorpay payment gateway includes built-in fraud detection algorithms that analyze transaction patterns to detect any potential fraud. These algorithms help ensure that all transactions within the app are secure and trustworthy.

By employing these algorithms, the app ensures robust functionality, delivering personalized, real-time, and secure features that address the dual goals of women's safety and empowerment.

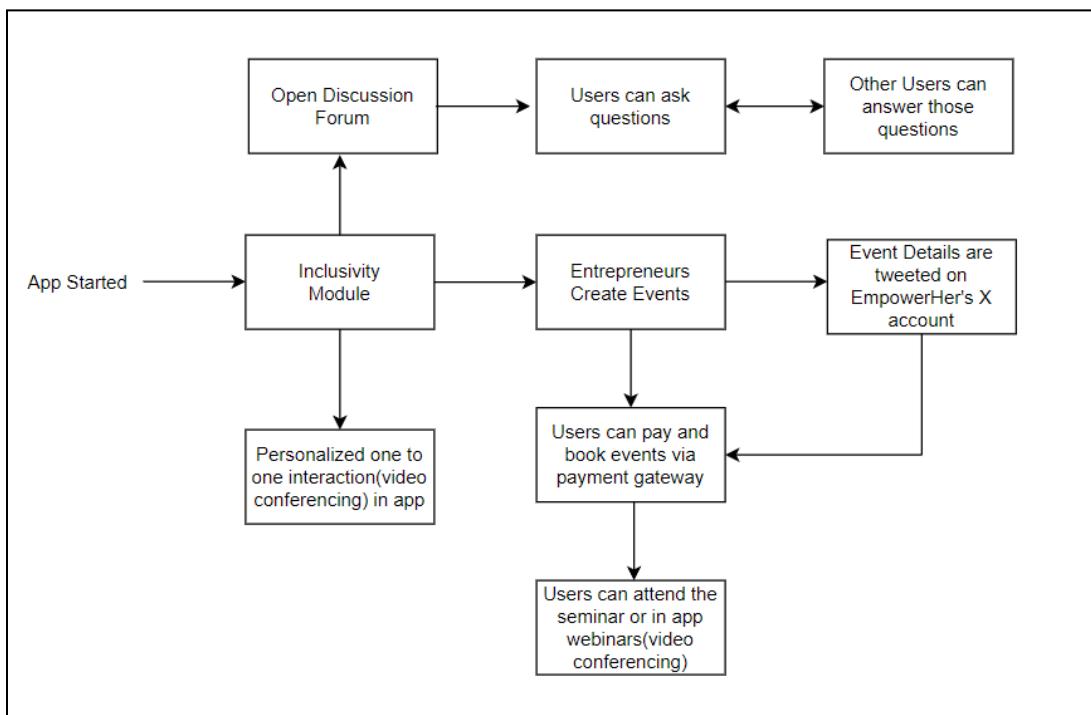
Chapter 4: Proposed Design

4.1. Block diagram Representation of the proposed system

1] Safety Module



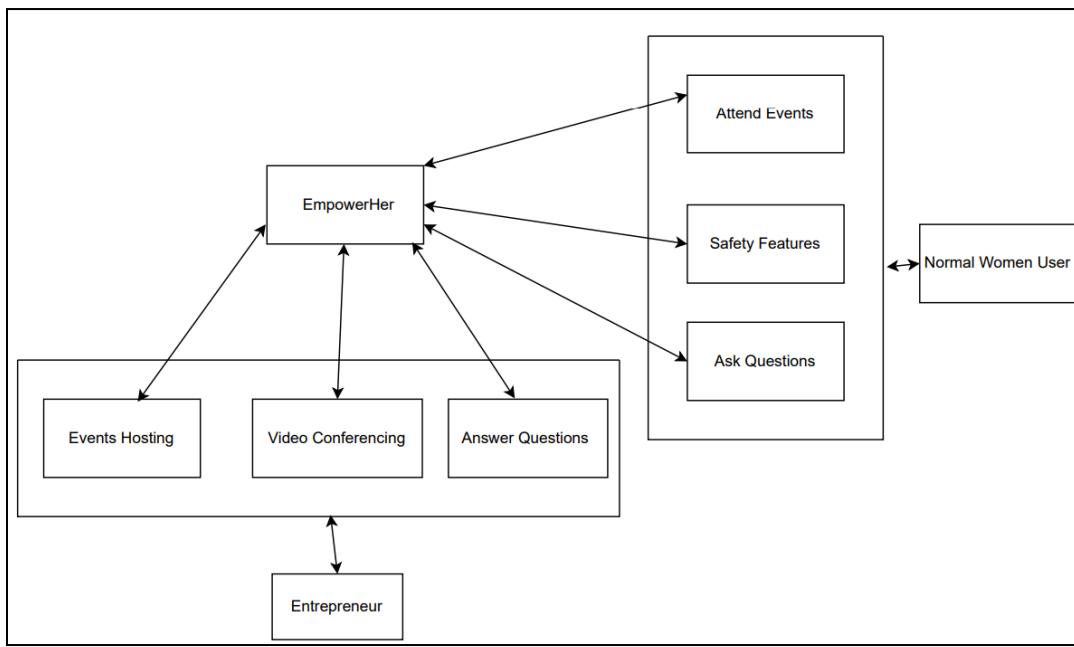
2] Inclusivity Module



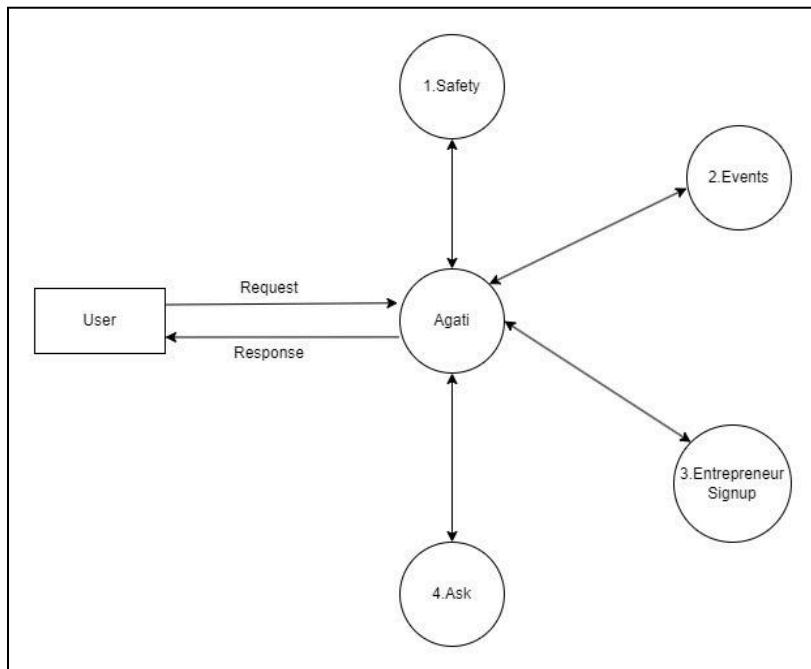
4.2 Modular design of the system

This diagram shows 2 modules of the app namely Safety and Inclusivity.

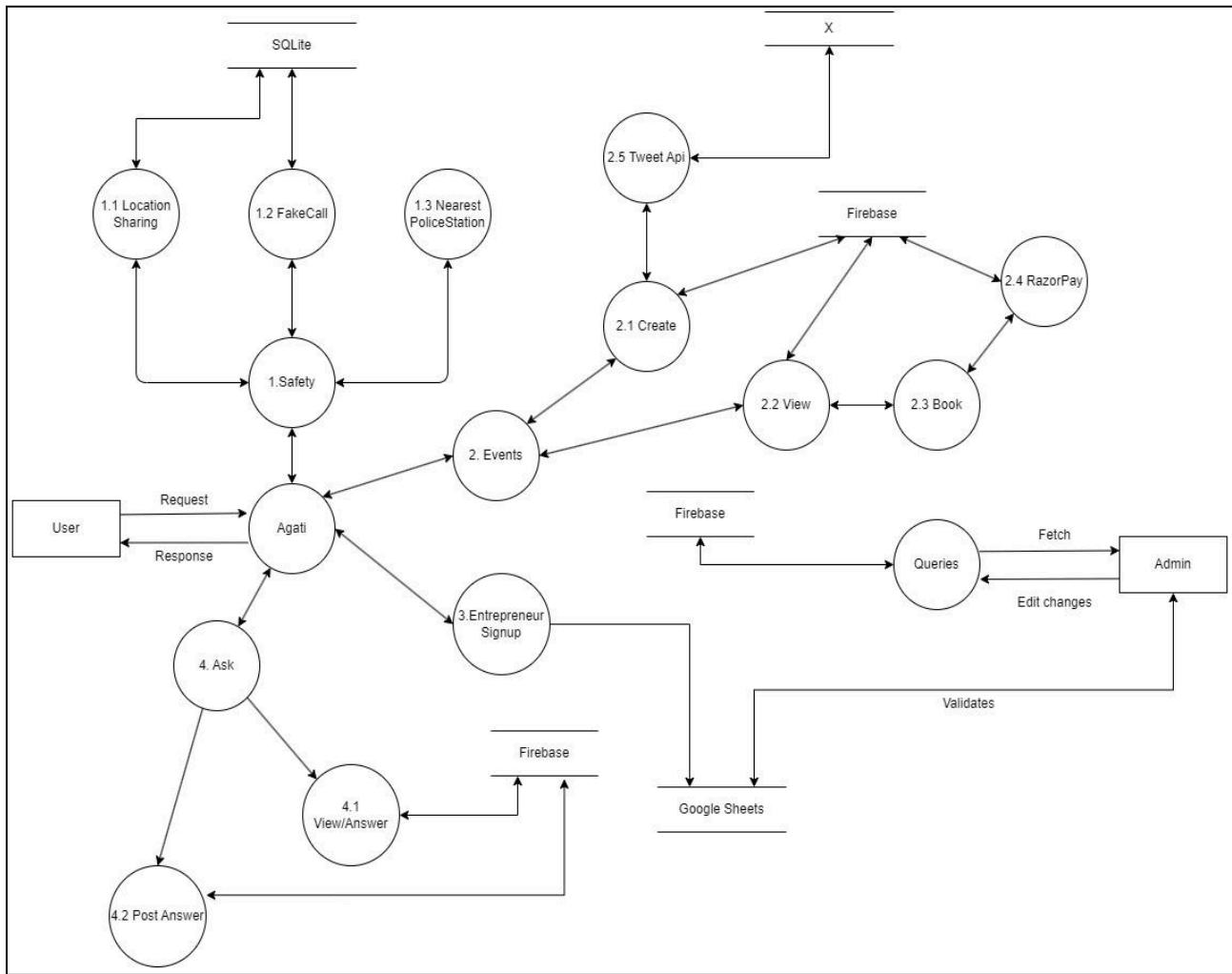
It highlights the main features of our app, like event hosting, video conferencing, discussion platform, safety features etc



DFD Level 0



DFD Level 1



1. Safety

The "Safety" feature provides key functionalities related to women's security. It integrates with various services like location sharing, emergency call (FakeCall), and finding the nearest police station. The system uses an SQLite database for storing necessary data.

1.1 Location Sharing

This feature allows users to share their real-time location with trusted contacts or authorities in case of an emergency. The data is stored in SQLite, and this information can be quickly accessed by concerned parties for safety measures.

1.2 FakeCall

The "FakeCall" feature simulates a phone call to help users exit potentially dangerous or uncomfortable situations. It is designed to trigger a pre-configured fake call from the app to create a distraction or excuse.

1.3 Nearest Police Station

This feature identifies the nearest police station using location services, providing the user with immediate access to nearby law enforcement.

2. Events

The "Events" section of your app facilitates user interaction with various women empowerment-related events. It allows users to create, view, and book events, with integrated payment support. Firebase is used for storing and retrieving event-related data.

2.1 Create

This feature allows users (event organizers or admin) to create new events within the app. It captures event details such as time, location, and description, and stores this information in Firebase. The event data is accessible for other users to view and engage with.

2.2 View

Users can browse through available events listed in the app. This feature retrieves event details from Firebase, allowing users to see upcoming events related to women's safety and empowerment. They can check information such as date, time, location, and event description.

2.3 Book

Once users find an event they are interested in, they can book a spot for that event. This functionality ensures a seamless booking process, and event details along with booking confirmations are stored and managed via Firebase.

2.4 RazorPay

The app integrates with RazorPay for secure online payments when users book paid events. This ensures that users can conveniently pay for events and get confirmation after successful transactions, leveraging Firebase to manage payment records.

2.5 Tweet API

This feature allows users to share events or promote them on Twitter. Using the Tweet API, users can quickly post event details on their social media platforms to raise awareness and get more participants involved.

3. Entrepreneur Signup

The **Entrepreneur Signup** module helps aspiring women entrepreneurs to register on the platform, encouraging participation in empowerment programs, mentorship, and business opportunities. This functionality is connected to Firebase to store and manage user details.

Key Functionality:

- **Signup Process:** Entrepreneurs can submit their personal and business information for registration on the platform.
- **Firebase Integration:** User details, such as name, business information, and contact details, are stored in Firebase for future reference and program eligibility.

4. Ask

The **Ask** module allows users to post questions related to women empowerment, safety, entrepreneurship, and other topics. It serves as a community Q&A section, where users can either ask questions or provide answers.

4.1 View/Answer

- **Firebase Integration:** The questions asked by users are stored in Firebase, and the system retrieves the relevant data when users want to view or answer queries.
- **Answering Questions:** Users or experts can answer posted questions, contributing their knowledge and support to the community.

4.2 Post Answer

- **Post an Answer:** Users can post answers to the questions from the community. This promotes engagement and knowledge sharing on important topics such as safety, empowerment, and entrepreneurship.
- **Response Feedback:** Answers provided by users are stored back into Firebase and made available for others to view and engage with.

4.3 Implementation

The implementation of the *Agati* app involves several key components and technologies that work together to create a robust platform for women's safety and empowerment. Below are the primary steps and considerations taken during the implementation phase:

1. Technology Stack

- **Frontend Development:** The app is developed using **Kotlin** with **Jetpack Compose** for a modern and responsive user interface. Jetpack Compose simplifies UI design and enhances user experience through its declarative approach.
- **Backend Development:** **Firebase** is utilized for backend services, providing real-time databases, user authentication, and cloud storage solutions. This allows for seamless data synchronization and user management.
- **Database:** **SQLite** is integrated for local data storage, ensuring critical functionalities (like safety features) are accessible offline.

2. User Registration and Profile Management

- A secure registration process is implemented using Firebase Authentication, allowing users to sign up using their email, Google, or other social media accounts. Users can create and manage their profiles, inputting categorical data (preferences, interests) and numerical data (age, frequency of events).

3. Safety Features Implementation

- **SOS Alerts and Fake Call:** Users can quickly trigger SOS alerts or a fake call through simple buttons in the app. These features utilize location tracking to send real-time updates to emergency contacts.
- **Dynamic Police Station Locator:** The app integrates Google Maps API to provide users with a map-based interface to locate nearby police stations based on their current location.

4. Event Recommendation System

- **Machine Learning Models:** K-mode and K-prototype clustering algorithms are implemented to segment users and provide personalized event recommendations. The models analyze user data to identify clusters and generate suggestions based on shared preferences and behavior.
- **Web Scraping:** Python libraries (e.g., BeautifulSoup) are used for web scraping to collect real-time data on government schemes and loans. This dynamic content is then displayed in the app, keeping users informed of relevant opportunities.

5. Chatbot Integration

- An AI-powered chatbot is developed using **Dialogflow** for natural language processing. This allows users to interact with the app through conversational queries, receiving assistance related to navigation, event recommendations, and information about government schemes.

6. Payment Gateway Integration

- A secure payment gateway, such as **Razorpay**, is integrated to facilitate seat reservations for events. This ensures that all transactions are secure and trustworthy.

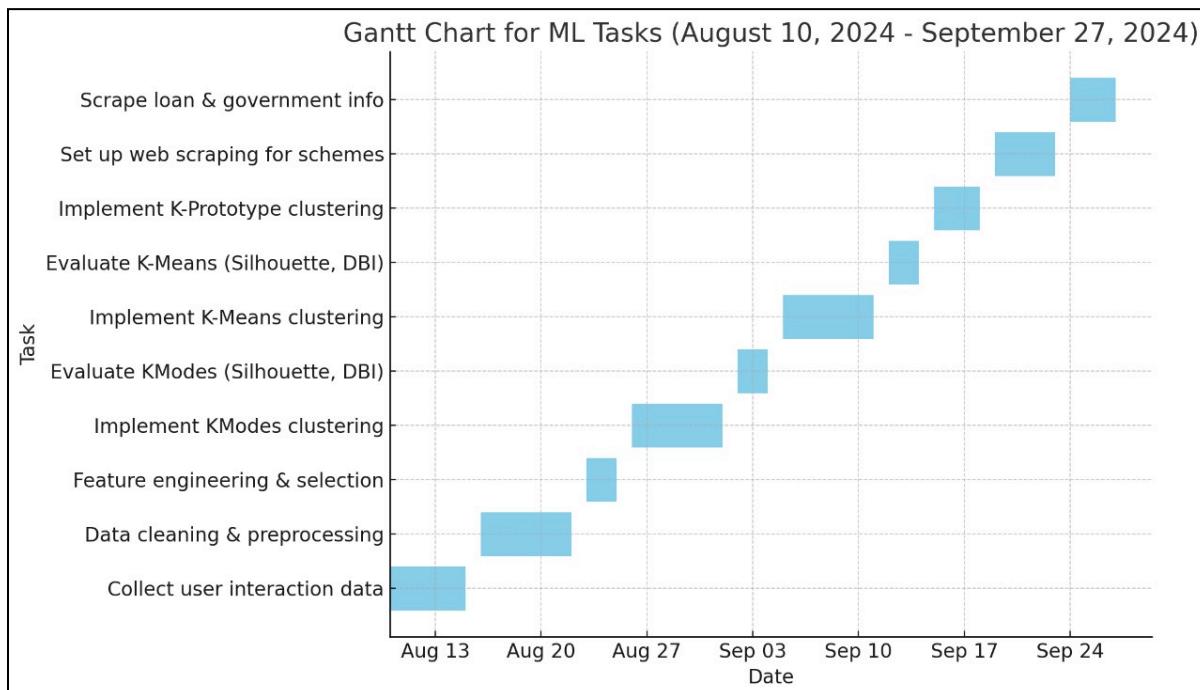
7. Testing and Quality Assurance

- Comprehensive testing is conducted throughout the development process, including unit testing, integration testing, and user acceptance testing, to ensure all features function as intended and provide a seamless user experience.

8. Deployment

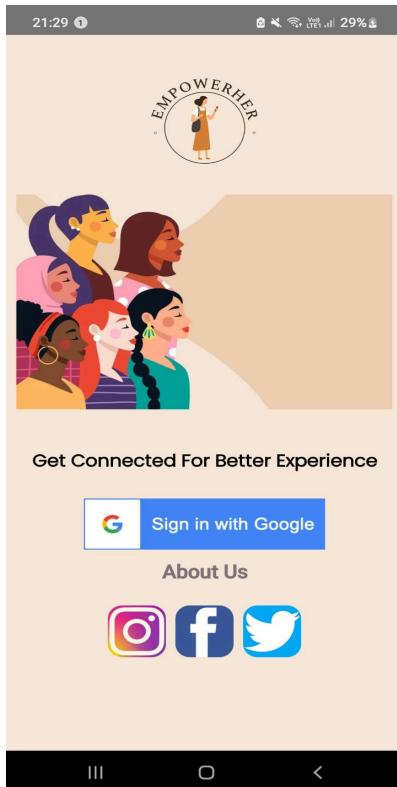
- The app is deployed on platforms like the **Google Play Store** after thorough testing and quality assurance. Continuous monitoring and updates are planned post-launch to address user feedback and improve functionality.

4.4. Project Scheduling & Gnatt Chart



Chapter 5: Proposed Results and Discussion

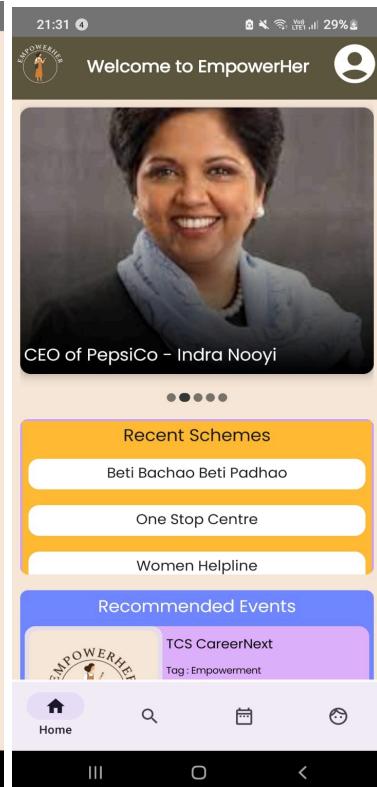
The first screenshot shows the login page of our Agati App, second screenshot shows the account creation which will take user interests which will be used by us later and the third screenshot shows the home page after login.



Login Page



Account creation



Home Page

Fig 1 shows the safety features of our app, it has 4 basic safety features namely fake call, alert, emergency and nearby police. Fig 2 shows the Events page of the app. Fig 3 shows the registration page for the user to register a particular event.



Fig 1: Safety Features

Fig 2: Events Page

Fig 3: Registration Page

Fig 4 and 5 shows the discussion forum where users can answer a question as well as ask a new question in the app. Fig 6 of the google form which is there for entrepreneurs before hosting an event on our app. Fig 7 is of the video conferencing integrated in our app for one on one video conference.



Fig 4 : Discussion Forum



Fig 5: Question Page

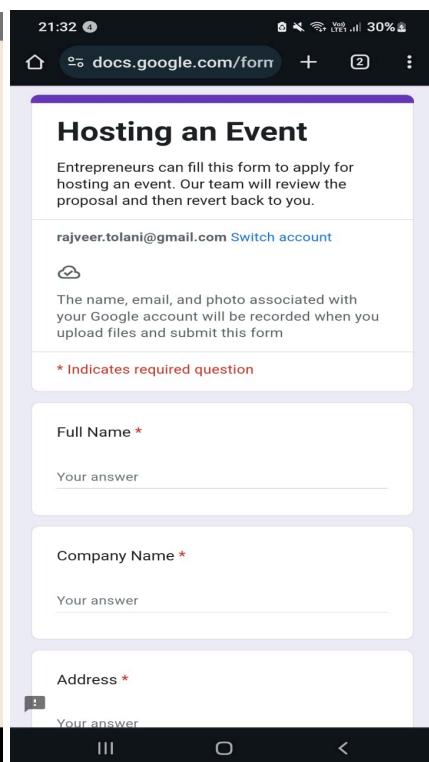


Fig 6: Hosting Event

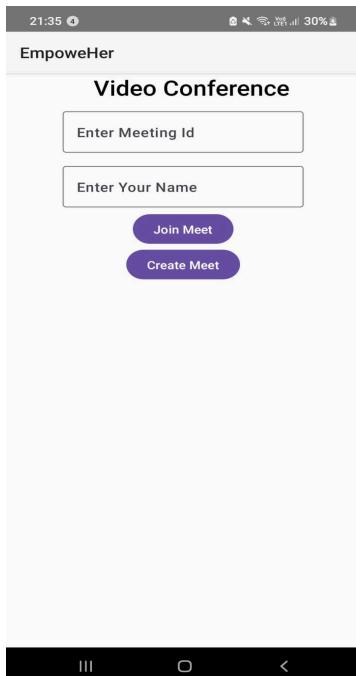


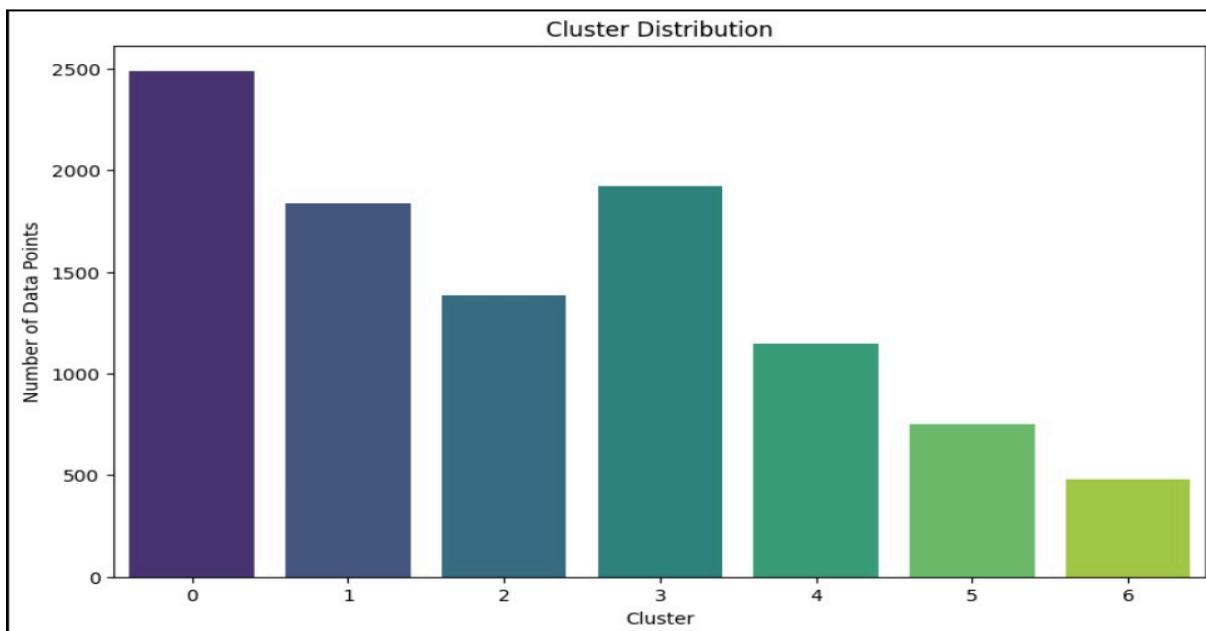
Fig 7: Video Conferencing

Results of Model trained:

KMode Clustering

K-mode clustering is tailored for categorical data. Instead of using means, it identifies clusters by determining the most common categorical value (mode) in each cluster. The algorithm employs a simple matching dissimilarity measure, where distances are calculated based on whether values are the same or different. K-mode is particularly useful for tasks like market basket analysis and customer segmentation based on categorical attributes.

K-mode clustering is ideal for handling categorical data in the *Agati* app, improving user segmentation and personalized recommendations. It clusters users based on common categorical attributes like event preferences, interests (entrepreneurship, financial literacy), language, and location. Instead of using averages like K-means, K-mode determines clusters by identifying the most frequent values (modes) in each category. For example, users who prefer entrepreneurial workshops and speak Marathi may form one cluster, while others interested in skill development events in English may be grouped differently.



Silhouette Score: 0.14077591039529366

Davies-Bouldin Index: 1.850367914162209

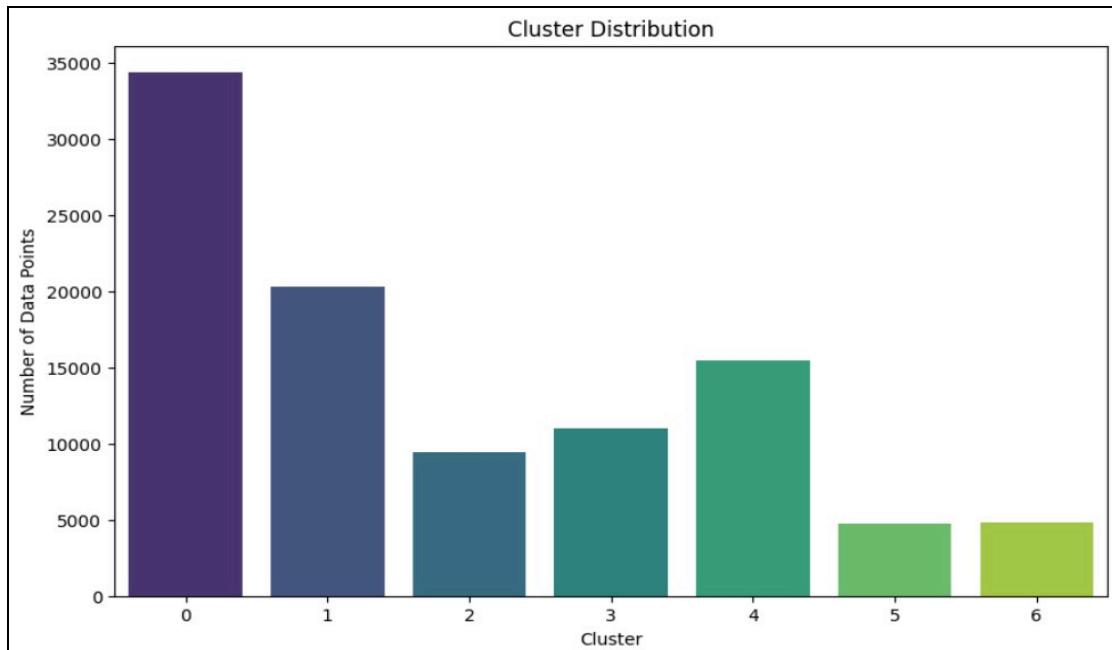
Cluster Centers:

```
[[1 1 1 0 0 1]
 [1 1 0 0 1 0]
 [0 0 0 0 0 0]
 [0 0 1 1 0 1]
 [1 0 1 1 1 0]
 [0 1 0 1 1 0]
 [0 0 0 1 1 1]]
```

KPrototype Clustering

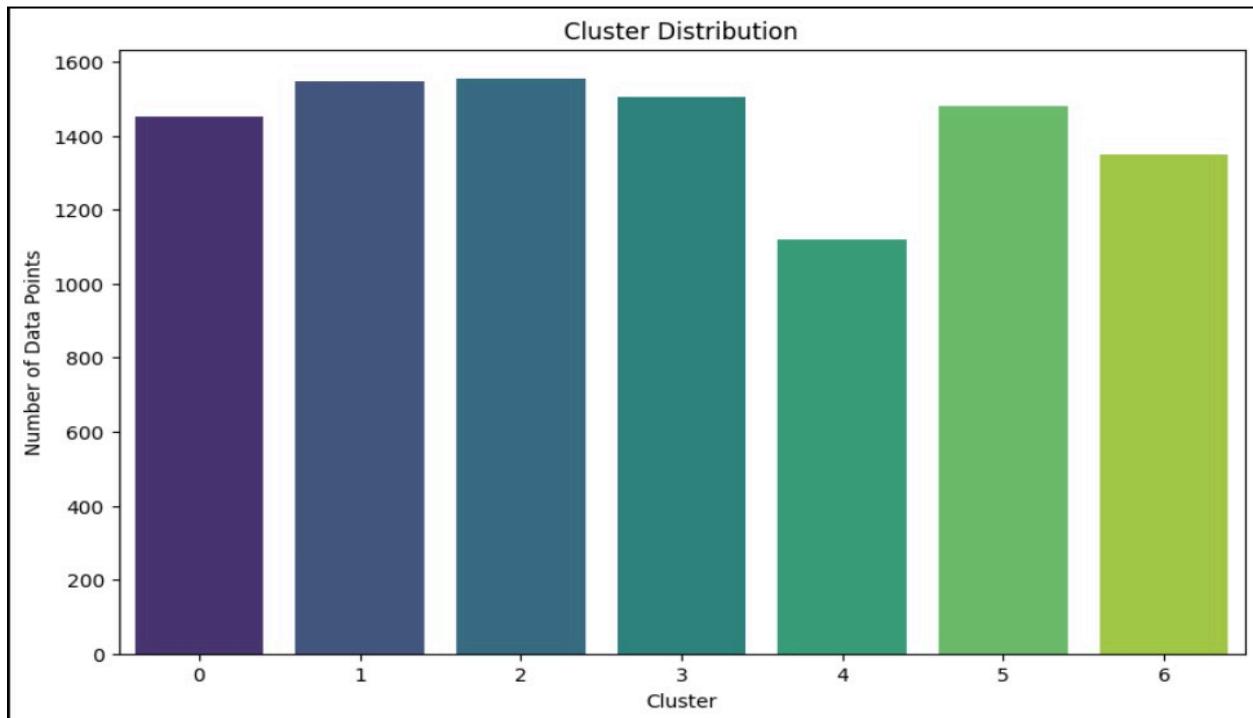
K-prototype clustering accommodates mixed data types, combining numeric and categorical features. It calculates distances using Euclidean measures for numerical data and a matching dissimilarity for categorical data. The algorithm updates both centroids and modes iteratively, refining cluster assignments until convergence. K-prototype is ideal for scenarios where datasets include a blend of numerical and categorical attributes, such as customer segmentation that incorporates various types of information.

In the *Agati* app, **K-prototype clustering** is instrumental in managing mixed data types, effectively handling both numerical and categorical attributes of users. The app collects various information, such as categorical data (e.g., preferred event type, language) and numerical data (e.g., age, frequency of event participation). K-prototype calculates distances using Euclidean measures for numerical attributes and matching dissimilarity for categorical attributes, allowing for comprehensive user segmentation. This capability enables the app to group users based on shared characteristics, facilitating targeted event recommendations and personalized content. For instance, users who frequently attend workshops and prefer specific languages can be clustered together, optimizing the relevance of suggestions for events, government schemes, and loans. By refining cluster assignments iteratively, K-prototype ensures that the app delivers tailored experiences, enhancing user engagement and satisfaction through precise recommendations that consider the full spectrum of user data.



KMeans Clustering

K-means clustering is an algorithm designed for numeric data. It partitions data into K clusters by initializing K centroids and assigning each data point to the nearest centroid based on Euclidean distance. The centroids are recalculated after each assignment, and the process repeats until the cluster assignments stabilize. This method is commonly used for applications like market segmentation and pattern recognition.



For our problem statement, K Modes suits best.

Why K Modes ?

K-modes are better than K-means and K-prototypes when dealing with categorical data. While K-means works well for numerical data by minimizing variance, it cannot handle categorical attributes since it relies on calculating means, which is not possible for categories. K-modes addresses this by using the mode, or the most frequent category, to update clusters, making it ideal for purely categorical data. K-prototypes combine aspects of K-means and K-modes to handle both numerical and categorical data, but K-modes are more efficient and simpler when only categorical data is involved. It avoids the complexity of mixed data and retains high interpretability, making it a better choice for clustering in scenarios with categorical variables.

Chapter 6: Plan of action for the next semester

a. Work done till date (4 - 5 Lines)

1. Completed the safety and inclusivity module.
2. Worked on a recommendation model which will recommend events to users on the basis of their personalized interest.
3. Worked on web scraping for fetching the latest government schemes dynamically.

b. Plan of action for project II

1. Complete the recommendation system and integrate it within the application.
2. Implementation of chatbot which will guide users about the app and different schemes.

Chapter 7: Conclusion

The *Agati* app represents a significant advancement in addressing the unique safety and empowerment needs of women in today's society. By integrating state-of-the-art technology with user-centered design, the app not only provides essential safety tools—such as SOS alerts, fake calls, and real-time police station locators—but also fosters community engagement through personalized event recommendations and access to valuable resources. The implementation of machine learning algorithms, such as K-mode and K-prototype clustering, ensures that users receive tailored content based on their preferences, enhancing user satisfaction and engagement.

Furthermore, the inclusion of web scraping for real-time information on government schemes and loans demonstrates the app's commitment to keeping users informed and empowered. The AI-powered chatbot provides an additional layer of support, guiding users through the app and answering queries related to safety and empowerment resources. Overall, *Agati* aims to create a safe and supportive environment for women, encouraging them to actively participate in learning and growth opportunities while ensuring their safety and well-being. With continuous updates and enhancements based on user feedback, the app is poised to adapt and evolve, making a lasting impact in the lives of its users.

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11] I'm Safe App on play store-

Link-<https://play.google.com/store/search?q=i%20am%20safe&c=apps&hl=en-IN>

12] Women Safety App on play store.

Link-<https://play.google.com/store/apps/details?id=com.manvithaapps.womensafety&hl=en-IN>

13] Abhivyakti App on play store.

Link-<https://play.google.com/store/apps/details?id=com.wes.abhivyakti&hl=en-IN>

14] U'r Safe App on play store

Link-<https://play.google.com/store/apps/details?id=com.ursafe&hl=en&gl=US>

15] B Safe App on play store

Link-<https://play.google.com/store/apps/details?id=com.bipper.app.bsafe&hl=en&gl=US>

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Draft of Research Paper

Agati - A Personalized Women's Safety and Empowerment App

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Abstract—Women in India face significant safety challenges in various environments, from urban to rural areas, leading to heightened vulnerabilities and reduced empowerment. This study aims to analyze the key factors that impact women's safety and empowerment, focusing on aspects such as social norms, crime rates, accessibility to support services, and technological engagement. The research will utilize statistical and machine learning models, including logistic regression, decision trees, and support vector machines, to identify the most significant predictors of women's safety perceptions and experiences.

Through comprehensive data analysis and modeling, this study seeks to uncover the complex interactions between these factors and their direct and indirect effects on women's safety and empowerment. The findings will inform the

development of the Agati app, providing personalized safety features and resources tailored to women's needs. Ultimately, this research aims to enhance women's safety, promote empowerment, and foster a supportive community, contributing to broader societal change.

Keywords—Women's safety, Empowerment, Personalization, Mobile app, Social norms, Crime rates, Support services, Technology, Data analysis, Machine learning.

I. INTRODUCTION

In a world where safety and empowerment should be fundamental rights, we recognize that women often face unique challenges. Our project aims to address these challenges head-on, with a focus on harnessing technology for positive change. In this project, we

will build an innovative app, "Agati," which is not just an app but a movement towards a safer, more equitable future for women everywhere. We believe that every woman should have the tools and resources to live a life free from fear and full of opportunity. With Agati, we are not only providing a sense of security but also fostering empowerment by leveraging technology, community, and support. Together, we can create a world where women can thrive, lead, and inspire without limitations.

Creating an application that promotes women's safety and entrepreneurship in rural areas is a remarkable endeavor that can bring about profound change. Our vision is not just a technological innovation; it's a beacon of hope and progress. By dedicating our energy and resources to this noble cause, we're not only developing a digital solution but also forging a path towards a more equitable society. In our hands, we hold the power to provide women in rural areas with the tools they need to feel safe, gain financial independence, and become architects of their own destinies. This project is not just about lines of code; it's about breaking barriers and shattering glass ceilings. Our determination, compassion, and commitment will pave the way for countless women to transcend limitations, unlock their potential, and shine as beacons of resilience and entrepreneurship. Stay inspired, for we are crafting a brighter future for women in rural areas, and our journey will undoubtedly inspire others to join the cause. Together, we can make a lasting impact on the world. Keep pushing forward with our remarkable vision, and let our dedication be the driving force behind this transformative endeavor.

II. RELATED WORK

1] P. Hamsagayathri and K. Rajakumari proposed the system that compares two machine learning algorithms, Support Vector Machine (SVM) and Reduced Error Pruning Tree (REPTree), for classifying customer reviews on e-commerce women's clothing to recommend products. The results reveal that REPTree outperforms SVM in terms of accuracy, precision, and recall. Specifically, REPTree achieves a classification accuracy of 91.43%, with precision and recall values of 93.75% and 96.04%, respectively, whereas SVM has an accuracy of 85.94%. This indicates that REPTree is more effective for classifying customer reviews in this domain.

2] Blessy Paul P1* and Cini Kurian proposed the system that evaluates the impact of skill-oriented courses on women's empowerment in Kerala using

five machine learning algorithms: Artificial Neural Networks (ANN), Random Forest, Decision Tree, Support Vector Machine (SVM), and Naive Bayes. It finds that ANN achieved the highest accuracy (95.78%), followed by Random Forest and Decision Tree (95.65% each), with SVM and Naive Bayes showing lower accuracy.

3] Sharifa Rania Mahmud, Jannatul Maowa and Ferry Wahyu Wibowo presented a system that is a mobile app called "Women Empowerment," which supports women by addressing safety, health, and legal needs. It features information on laws related to violence, a forum for anonymous support, health resources on issues like pregnancy and mental health, and an Emergency Call System that sends alerts and location details to contacts and the police during emergencies. The app aims to empower women by providing essential tools and resources in one platform.

4] E. Sankar, CH. Aditya Karthik, A. Sai Kiran, proposed a system which app for enhancing social safety, particularly for women, children, and the elderly. Users can trigger SOS alerts by pressing a button, shaking the phone, or through IoT devices that monitor health. The app sends real-time location and health data to emergency contacts and people within 500m, helping with quick rescue. It also features feedback collection and safety guidelines, aiming to ensure faster help during emergencies and plans future integration with smart devices.,

5] Kunal Kataria, Rushikesh Khade, Rohit Kurhade, Amit Pende, Prof. Sonal Chanderi, proposed a system where an Android app is designed for women's safety. It highlights the app's key feature: an emergency "HELP" button that sends SMS alerts with the user's GPS location to pre-registered contacts. The app continues sending location updates every few minutes until the user is safe. It also supports audio recording for future evidence. The paper suggests improvements like offline mode and potential integration with law enforcement databases, aiming to provide comprehensive protection even in situations without network access. The goal is to help women in dangerous situations quickly and efficiently.

6] Manvar H. A., Kathiriya J. B., and Rajpura M. R., proposed a study which focuses on the role of Self Help Groups (SHGs) in empowering women in Rajkot District, Gujarat. Conducted between January and July 2022, the research highlights that most women were engaged in agriculture, with many living in joint families and possessing basic household assets. Education was a key factor in

empowerment, though a significant portion of women had minimal schooling. SHGs contributed to financial independence by providing credit and promoting self-employment, which enhanced women's decision-making power. While SHGs have made progress, further improvements in education, employment, and societal attitudes are needed to fully empower women.

7] Prof. Aditi Patil, Shraddha R. Ramshette, Chaitali L. Dhengle, Hamd J. Ansari, Sayali S. Madhurkar, proposed a "**Women Safety App**" aimed at addressing women's safety concerns. The app uses GPS to track the user's location and send alerts to pre-registered contacts, including family members and nearby police stations. It also offers features like finding the safest routes, sending emergency emails, and displaying routes on a map. Additionally, the app includes a self-defense video guide and supports tracking updates every five minutes. The system relies on Support Vector Machine (SVM) algorithms to enhance location tracking and safety

8] Prof. Rakesh S, Mr. Swapnil Khairnar, Mr. Shivesh Kumar, Mr. Alquama Sayyed, Mr. Prathamesh Giri, "Women Safety Application using Machine Learning," International Journal for Research in Applied Science & Engineering Technology (IJRASET), ISSN: 2321-9653; Volume 9 Issue V, May 2021

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10] Tanusri Dey, Upama Bhattacharjee, Sanjana Mukherjee, Tripti Paul, Rachita Ghoshhajra, proposed the system **We'RSafe** app, designed for women's safety. It sends alert messages and shares the user's location with emergency contacts during distress. The app also includes features like alarming neighbors, auto-dialing emergency numbers, and locating nearby police stations or hospitals. Developed using Java and Android Studio, the app aims to reduce violence against women by providing immediate assistance during emergencies. Future improvements include integrating the app into wearable devices like watches or wristbands with GPS functionality

11] I'm Safe App on play store

12] Women Safety App on play store

13] Abhivyakti App on play store

14] U'r Safe App on play store

15] B Safe App on play store

16] Women Entrepreneurs Central IL App on play store

17] build - Business Lessons App on play store

III. METHODOLOGY

For the methodology specifically related to ML model, web scraping, and chatbot development in your app, here's a breakdown:

1. Machine Learning Model (Event Recommendation System)

Requirement Analysis:

Goal: Develop a recommendation system to suggest relevant events based on user preferences, past behavior, or event popularity.

Data Collection: Gather data like user profiles, event preferences, user-event interaction history (e.g., events attended, likes), and event metadata (type, category, location).

Data Preprocessing:

Data Cleaning: Handle missing values, inconsistent data, and duplicates in the event/user datasets.

Feature Engineering: Extract relevant features like event categories, user interests, and geographical preferences.

Normalization: Apply scaling or normalization to the features, if necessary.

Model Selection:

Algorithm Choice:

Collaborative Filtering: To recommend events based on user similarity and past interactions.

Content-Based Filtering: To recommend events based on the attributes of the events (e.g., categories) that match the user profile.

Hybrid Model: Combining collaborative filtering and content-based filtering for better accuracy.

Model Training:

Model Training: Use techniques such as:

Matrix Factorization (e.g., SVD): To find hidden patterns in user-event interactions.

k-NN (k-Nearest Neighbors): To compute similarities between users based on event preferences.

Use libraries like TensorFlow, Scikit-learn, or PyTorch for training and evaluation.

Evaluation:

Metrics: Evaluate model performance using metrics like precision, recall, F1-score, and mean squared error (for rating predictions).

Cross-validation: Perform k-fold cross-validation to ensure model robustness.

Deployment:

Integration: Deploy the model using Firebase ML or TensorFlow Lite for real-time event recommendations.

Real-Time Updates: Use Firebase Firestore to feed real-time user interactions into the model to continuously update recommendations.

Web Scraping (Latest Government Schemes and Loans)

Requirement Analysis:

Goal: Scrape dynamic content like government schemes, loan information, and financial assistance programs to keep users informed.

Tool Selection:

Libraries: Use Python-based tools such as:

BeautifulSoup: For parsing HTML and extracting relevant content.

Scrapy: For building robust, scalable scrapers that can crawl multiple pages.

Selenium: For scraping websites that load content dynamically with JavaScript.

Scraping Process:

Target Websites: Identify trusted sources such as government portals, financial institutions, or public databases that provide updates on schemes.

Data Extraction:

Define rules to scrape specific sections of the webpage, such as tables, headlines, and links.

Handle pagination or dynamic content loading using Selenium if necessary.

Data Cleaning & Transformation:

Data Cleaning: Process raw HTML data to remove noise (e.g., advertisements, navigation menus) and extract meaningful content.

Transformation: Convert the scraped data into a structured format (e.g., JSON, CSV) to store in a database like Firebase or SQLite.

Chatbot Development (Guiding Users and Providing Scheme Information):

Requirement Analysis:

Goal: Develop a chatbot that can assist users in navigating the app, finding relevant features, and answering queries about government schemes and loans.

TensorFlow: For building a custom chatbot with deep learning-based NLP if needed.

Conversation Flows: Design conversation flows for various scenarios like guiding users, providing event details, answering FAQs about schemes, and offering step-by-step instructions.

Action Handling: For tasks that require interaction with external APIs (like querying events or government schemes), implement logic in the chatbot to fetch data in real-time.

Deployment:

App Integration: Integrate the chatbot into the app using a Kotlin-based interface, allowing users to interact with it directly.

Real-time Interaction: Use Firebase or a cloud service to handle user inputs and provide immediate responses.

Continuous Learning:

Feedback Loop: Collect user feedback on chatbot responses to retrain and fine-tune the NLP model over time, ensuring better accuracy and interaction quality.

Monitoring:

Performance Tracking: Monitor chatbot performance using metrics like user satisfaction, response time, and query accuracy. Continuously improve based on feedback and interaction logs.

This methodology breaks down the development and integration of the ML recommendation system, web scraping, and chatbot into structured phases. It ensures smooth deployment and real-time interaction while keeping the app up-to-date with dynamic information and personalized features.

IV. IMPLEMENTATION

In the machine learning aspect of our project, we employed multiple clustering techniques to gain insights into user preferences and behavior, which are crucial for developing an effective recommendation system. We initially applied the K Modes algorithm to categorize users based on their responses to various categorical variables related to empowerment, education, and event interests. Following this, we used the KMeans algorithm to analyze numerical data, allowing for a deeper understanding of user behavior patterns. To accommodate mixed data types effectively, we also utilized KPrototypes, which enabled the clustering of both categorical and

numerical features without losing valuable information.

We rigorously evaluated the performance of each clustering method using metrics like the Silhouette Score, which measures how well each object lies within its cluster, and the Davies-Bouldin Index, which assesses the separation between clusters. Additionally, we generated visualizations such as cluster distribution plots to illustrate the segmentation of users visually, providing a clear picture of how different user groups interact with the app. This clustering work sets the foundation for developing a recommendation system that will suggest relevant events to users, thereby enhancing their overall experience.

Simultaneously, we focused on the web scraping component to enrich the app with timely and relevant information regarding government schemes. We constructed a robust web scraping tool using BeautifulSoup, targeting the Ministry of Women and Child Development (WCD) website. This tool efficiently extracted the names and corresponding links of various government schemes, ensuring that users have easy access to the latest initiatives directly within the app. The scraped data will be integrated into the app, providing users with a centralized source of information about available schemes, thereby increasing engagement and empowerment. The combination of machine learning and web scraping aims to create a more personalized and informative user experience.

Key Points:

We employed clustering techniques: KModes, KMeans, and KPrototypes to analyze user behavior and preferences.

We evaluate clustering performance using the Silhouette Score and Davies-Bouldin Index for quality assessment.

We generated visualizations of cluster distributions to better understand user segments.

We developed a recommendation system to suggest relevant events to users based on their cluster profiles.

We constructed a web scraping tool with BeautifulSoup to extract information about government schemes from the WCD website.

We integrated the scraped data into the app for easy user access to the latest government initiatives, enhancing engagement and empowerment.

V. RESULTS

K Modes, K Prototypes and K Means were employed for clustering the data points.

K-mode clustering is an unsupervised machine-learning technique used to group a set of data objects into a specified number of clusters, based on their categorical attributes. The algorithm is called “K-Mode” because it uses modes (i.e. the most frequent values) instead of means or medians to represent the clusters.

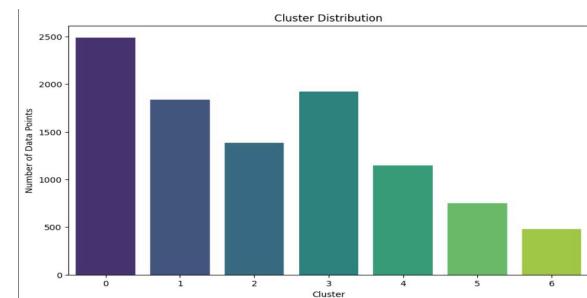


Fig.2.1 K Modes graph

The K-Prototypes algorithm does this by introducing a combined dissimilarity measure. For numerical attributes, the dissimilarity measure is the same as in K-means — the squared Euclidean distance. For categorical attributes, the measure is a simple matching dissimilarity measure, as in the K-modes algorithm.

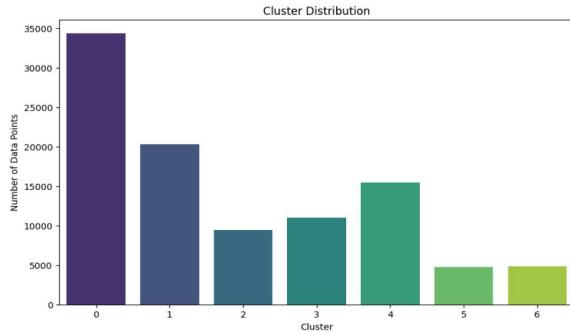


Fig. 2.2 K Prototypes graph

K-Means clustering is a popular algorithm used to group data into k clusters based on their similarities. The algorithm works by iteratively assigning data points to the nearest cluster centroid, and then updating the centroid based on the new cluster members.

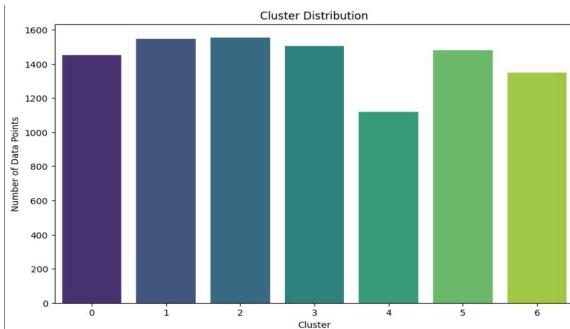


Fig. 2.3 K Means graph

For our problem statement, K Modes suits best.

Why K Modes ?

K-modes are better than K-means and K-prototypes when dealing with categorical data. While K-means works well for numerical data by minimizing variance, it cannot handle categorical attributes since it relies on calculating means, which is not possible for categories. K-modes addresses this by using the mode, or the most frequent category, to update clusters, making it ideal for purely categorical data. K-prototypes combine aspects of K-means and K-modes to handle both numerical and categorical data, but K-modes are more efficient and simpler when only categorical data is involved. It avoids the complexity of mixed data and retains high interpretability, making it a better choice for clustering in scenarios with categorical variables.

Performance Metrics of K Modes

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Silhouette Score: 0.14077591039529366
Davies-Bouldin Index: 1.850367914162209
Cluster Centers:
[[1 1 1 0 0 1]
 [1 1 0 0 1 0]
 [0 0 0 0 0 0]
 [0 0 1 1 0 1]
 [1 0 1 1 1 0]
 [0 1 0 1 1 0]
 [0 0 0 1 1 1]]

```

VI. CONCLUSION AND FUTURE SCOPE

The Agati app, designed for personalized women's safety and empowerment, has demonstrated significant potential in addressing the pressing issues of safety and security faced by women today. Through its innovative features—such as emergency response, real-time location sharing, and community support—the app effectively enhances user confidence and accessibility to assistance. The analysis reveals that user engagement is driven by the app's ability to provide timely help and resources, ultimately fostering a sense of security among its users. This underscores the importance of integrating technology with community awareness to create safer environments for women.

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