Night-Out

Project ID: TMP-23-379

Final Project Thesis

S.T.R.SIRISINGHE

BSc Special (Hons) - Information Technology

(Specialization in Information Technology)

Department of Information Technology

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S.T.R.SIRISINGHE - IT19100012

Supervisor: Dr. Amitha Caldera

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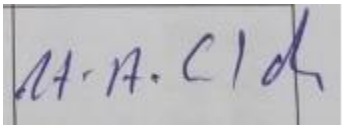
DECLARATION OF THE CANDIDATE AND SUPERVISOR

We declare that this is our own work, and this project proposal does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

Name	Student ID	Signature
S.T.R.SIRISINGHE	IT19100012	

The above candidates are carrying out research for the undergraduate dissertation under my supervision.



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Dr. Amitha Caldera Date

ABSTRACT

Currently, with the escalating use of social media, individuals are increasingly becoming disconnected from their real-life relationships, choosing instead to interact in a virtual environment. This phenomenon has resulted in the neglect of the importance of physical meetups and gatherings. The major consequence of this trend is the feeling of isolation and being overwhelmed in new surroundings. Individuals relocating to new environments may face significant difficulties adapting to their new lives. The absence of social connections, unfamiliar surroundings, and limited knowledge about the new place may cause them to feel alienated and lonely, leading to social isolation. This can have serious implications for an individual's mental health, leading to stress, depression, and other related issues.

This issue extends to the business aspect, where current market applications that promote businesses do not address the above-mentioned problem. Therefore, a comprehensive application that caters to all aspects is imperative. The lack of such an application has been a significant reason why businesses fail, as a result of investing in the wrong areas without proper statistical data.

The proposed solution is to create a personalized nightlife application that curates entertainment options based on user preferences and interests. The system will learn about individuals over time and provide customized recommendations based on their preferences. By providing personalized solutions, this application has the potential to reduce feelings of loneliness and isolation among individuals new to their surroundings, thereby enhancing their overall mental health. Additionally, this system can categorize individuals into relevant communities by analyzing their interactions with others and identifying shared interests to provide personalized and community-based recommendations.

After performing this process, users with similar interests will be able to connect with one another, providing a solution to the aforementioned problem, while also aiding businesses by providing analytic techniques based on gathered community data. Through machine learning algorithms, detailed reports including trending events and how they generate profits will be generated to assist businesses in event planning and hosting.

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LIST OF ABBREVIATIONS

GUI	Graphical User Interface
API	Application Programming Interface
USA	United States of America
USD	United States Dollars
IT	Information Technology
WBC	Work Breakdown Chart

1 INTRODUCTION

The proposed system primarily aims to address the increasing issue of social media's impact on interpersonal connections. The system is designed to function as a social media application, connecting individuals in the physical world, while simultaneously providing businesses with essential statistical information to better understand their clientele. By facilitating real-life interactions between users and generating profits for businesses, the system aims to mitigate the effects of social media's potential to harm interpersonal relationships.

1. Entertainment based platforms

The widespread adoption of digital platforms has led to a rapid surge in the popularity of online entertainment. This trend is largely attributable to the convenience and accessibility afforded by these platforms. The evolution of the internet and technological advances have revolutionized the consumption of entertainment, resulting in a significant departure from traditional modes of engagement. From streaming movies and music to participating in online gaming and sports betting, the range of options for online entertainment appears to be limitless. [2]

The emergence of entertainment applications can be traced back to the 1990s and early 2000s when streaming platforms were introduced as a proof of concept. The first-ever live stream was achieved through a technology called Multicast backbone created by Van Jacobson in 1993. In the following year, ESPN streamed live audio for the Seattle Mariners vs. New York Yankees game. With the advancement of real-time messaging protocol, Adobe Flash started video streaming, and mass media platforms like Twitch and Netflix were launched in the age of 2001-2010. Soon after, iPhone started streaming using HTTP live streaming. Live streaming became popular during the 2010s, along with an increase in video consumption on mobile devices, but latency also became a concern. Netflix disrupted the industry, and Hulu maintained a healthy level of competition. In 2021-2022, several platforms, including Disney+, Peacock, Paramount+,

Apple TV+, HBO Max, Amazon Prime Video, YouTube TV, and fubo TV, emerged and continued to grow. [4]

The proliferation of content creation and technological advancements have created a new market for entertainment, prompting a shift in consumer behavior from conventional viewing channels such as theaters and televisions to online content delivery platforms. This transformation was made possible by recent technological innovations, including but not limited to, 4G services, advanced smartphone operating systems, and server improvements. Online entertainment platforms have facilitated greater accessibility to content and provided it across a wide variety of mobile devices, such as smartphones, tablets, and laptops, thereby enhancing convenience. This development has enabled consumers to download exclusive content and share it with others, as well as access a vast library of content at a low cost, without utilizing storage space on their devices.

2. Social Media Networks and Platforms

In the past two decades, social media has become an essential communication tool among people. The number of social media users has significantly increased and is expected to continue growing. As of 2021, there were over 4.26 billion social media users globally, and this number is projected to reach nearly six billion in 2027. [3] That proves how important social media is to people these days.

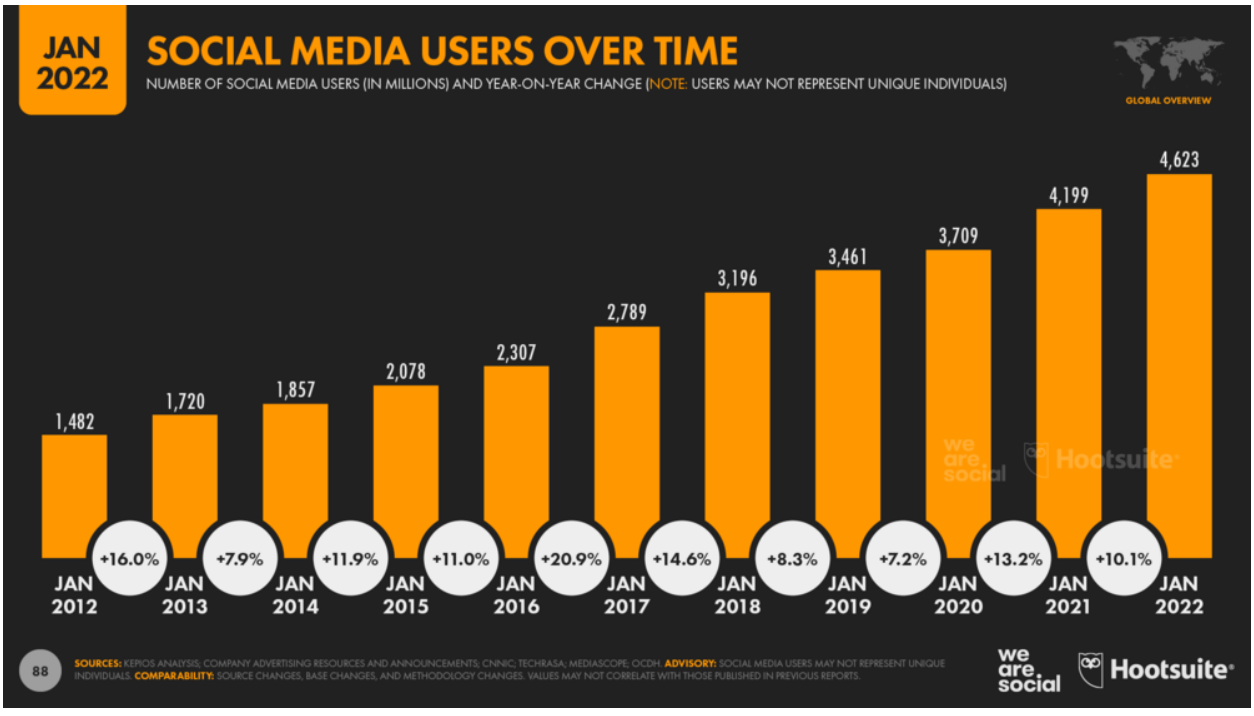

Figure 1 : Social media users over time

Source : DataPortal.com (2022)

The National Science Foundation launched NSFNET in 1987, and the first social media site was introduced a decade later. Friendster followed in 2001, offering email address registration and basic online networking. In 1999, blogs became popular with the debut of Live Journal, and in 2002, LinkedIn was established as a professional networking site. As of 2020, LinkedIn had over 675 million users worldwide. Before Facebook surpassed Myspace as the most popular website worldwide in 2006, Myspace ranked first. There are numerous social media sites vying for the attention of the world's more than 5 billion consumers right now. As social media companies grew their user bases into the hundreds of millions, Facebook, Twitter, and other social platforms began to create business applications. Advertisers weren't restricted to using traditional media anymore.

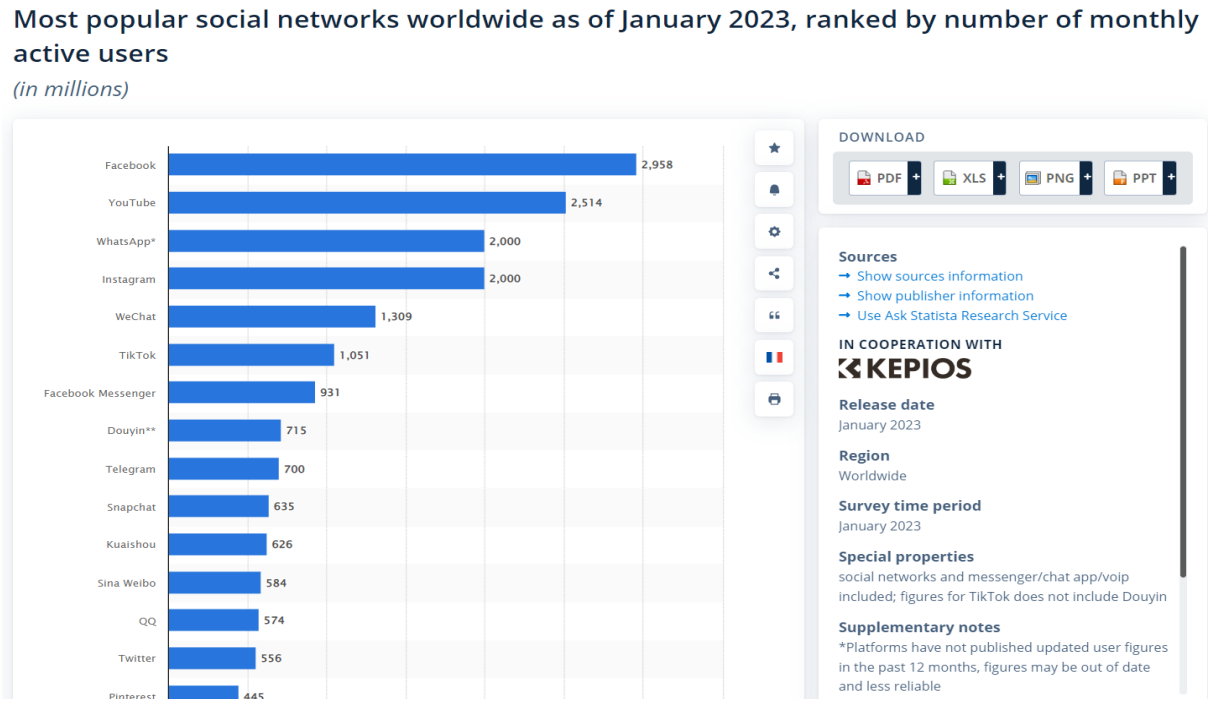

Figure 2 : Popular social media networks

According to type social media can be divide as following [6],

1. Traditional social networking sites
   Ex: LinkedIn, Facebook, Twitter
2. Social review sites
   Ex: Facebook, Amazon, Google My Business
3. Image and video sharing sites
   Ex: Snapchat, YouTube, Instagram

4. Video hosting sites
   Ex: Spotlightr, YouTube, Dailymotion
5. Community blogs
   Ex: Tumblr, WordPress, Medium
6. Discussion sites
   Ex: Reddit, Digg, Quora
7. Sharing economy networks
   Ex: eBay, Uber, Freelancer, AirBNB

Our proposed system is a hybrid of traditional social networking and social review sites, combining features from both types of platforms. It includes socialization services to connect people and a community recommendation system where users can write reviews and engage with others. However, it also offers unique features not found on other social media platforms, including a profit maximization system that provides users with insights to enhance their businesses and refine their strategies for different customer segments.

3. Hotel industry

Effective management is essential when a large gathering of individuals convenes for an event. Hotel event management serves to facilitate the seamless execution of events hosted at a hotel. This requires meticulous tracking of customer attendance, individual preferences, identification of market trends, heightened efficiency, accurate business forecasting, and staying abreast of industry competitors. The acquisition of precise information is pivotal in achieving these objectives. There are two main kinds of events : cooperative and non-cooperative. [7]

Cooperative;

1. Business meetings: A crucial aspect of conducting business in a professional setting. These meetings may take the form of board member meetings, whiteboard discussions, or any important meeting between two or more companies for a business purpose. Such arrangements may include the provision of audio-visual equipment, such as projectors and screens, reliable and high-speed internet access, charging points for laptops, a comfortable meeting room with proper lighting and ventilation, whiteboards and markers for brainstorming and visual aids, and refreshments such as

tea, coffee, water, snacks, or meals depending on the duration and timing of the meeting.

2. Product launch : A pivotal event where a company announces the release of a new product or service. These events can take on the form of a celebratory party or conference, while generally carrying a more promotional and festive nature. The type of venue selected may vary according to the nature of the product.
3. Training and workshops : Educational events designed to provide learning opportunities for attendees, wherein a select few individuals impart knowledge to many. Depending on the size and scope of the training or workshop, a hall with appropriate audio and video systems may be necessary.
4. Organizational parties: Large-scale events conducted by big organizations, often held monthly or annually. These events may take the form of reward functions, annual celebrations, or team parties, among other things. Organizing such events requires significant attention to detail, particularly with regard to security measures.

Non-cooperative;

1. Weddings: Significant life events that can vary in scale from small and intimate gatherings to large-scale productions. Organizing a wedding requires extensive planning and coordination, including arrangements for accommodations, catering, and a variety of wedding-related functions. Additionally, there may be cultural or traditional rituals that need to be incorporated
2. Festivals: including music and dance festivals, are often organized by hotels for the entertainment and enjoyment of their guests. These events may take place over a single evening or span several days
3. Social gatherings: Small-scale occasions, including birthday and anniversary parties, usually last for several hours. Customers typically indicate the requirements for these events, providing the menu and other pertinent information.

According to recent research, a significant majority of event planners - namely 91% - have reported experiencing a positive return on investment through their use of mobile event applications. Furthermore, According to the study's findings, social media is the most efficient technique for event promotion, as indicated by 74% of respondents. Other commonly cited tools for event marketing include email marketing, identified by 66% of event planners, their website, which 60% of planners reported to be effective, and event registration sites, which were noted by 26% of respondents. [8]

1.1 Background survey

To gather insights into the specific needs and expectations of users with regard to event management and socialization, we are planning to administer a Google Form survey. Through this survey, we aim to collect data that will enable us to gain a better understanding of what individuals expect when attending events, and what they hope to derive from their participation in various social communities. By conducting this survey, we hope to be able to tailor our event management and socialization strategies to more effectively meet the unique needs and preferences of our users, and to provide them with a more personalized and engaging experience when they attend events. We are committed to utilizing the data gathered through this survey to inform our ongoing efforts to improve the quality and relevance of the events and to create a more inclusive and supportive community for all attendees.

To identify the main problems and issues within the domain, and to get an overall idea about the domain such as to whom we provide this solution and how the problems diverse, we conducted a google form and 378 people have responded.

1. User Age

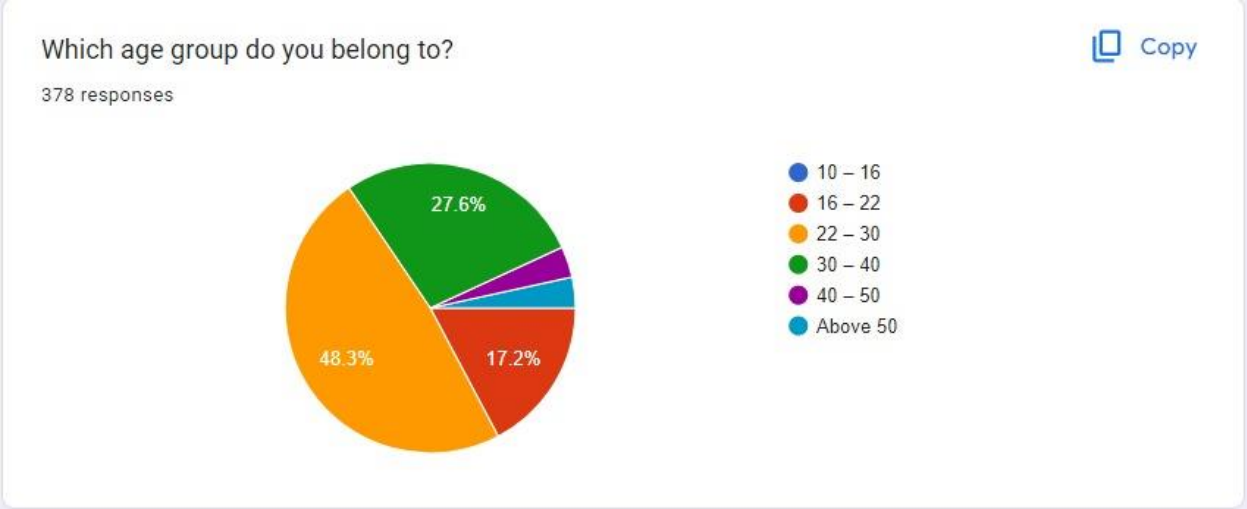

Figure 3 : Age groups of the users

Out of the sample of 378, 48.3% of the people have responded that they are between 22-30 years which means most of the participants were younger crowd. The second and the third age groups were to respond is 30-40 and 16-22 which are adjacent to th2 22-30 group. From the result, we can assume the users will be mainly 22-30 years of age.

2. User Gender

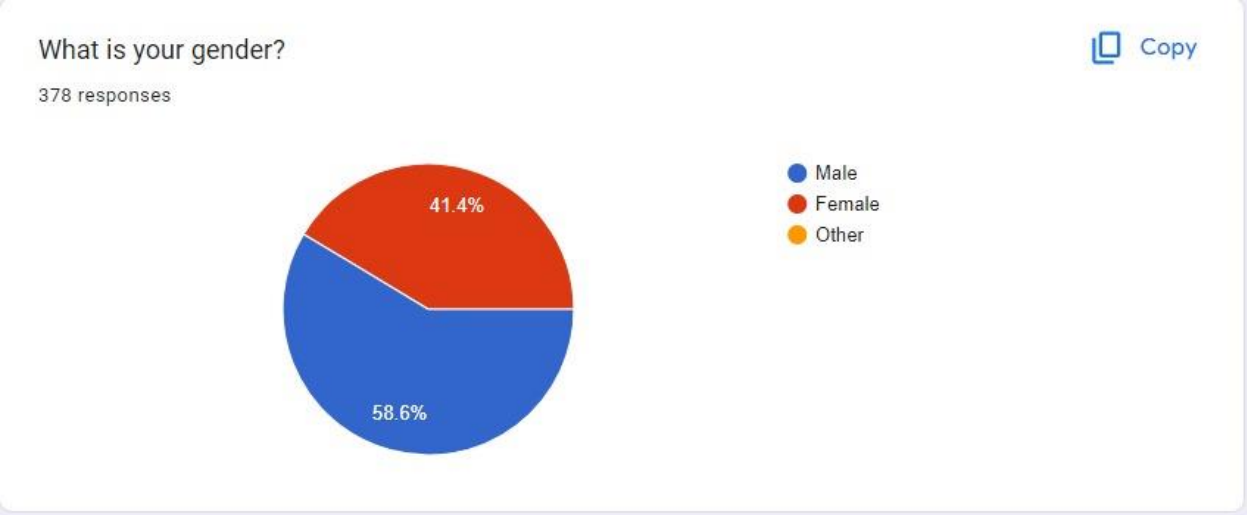

Figure 4 : User Gender

Out of the 378 responses received, 58.6% of the participants identify them as male and the rest is identified as female. This information is essential when considering the human computer interaction aspects of the app. App color themes and the user friendliness highly depends on the user gender and the age group.

3. User Type

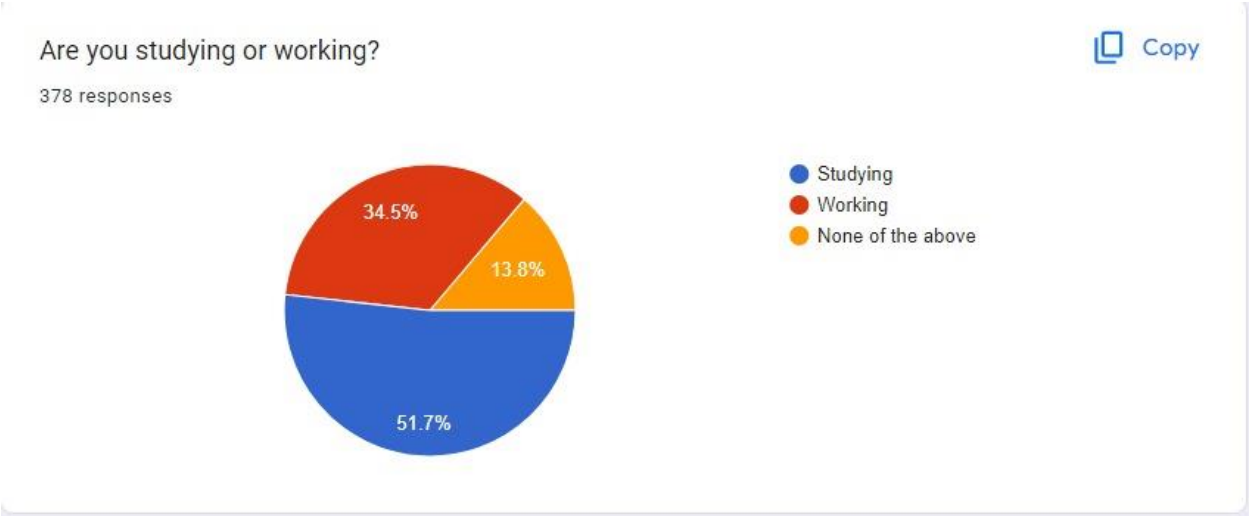

Figure 5 : User Type

According to the survey, 51.7% of people have responded that they are studying and 34.5% of them are working and 13.8% of them are not working nor studying respectively. This information is really helpful when deciding what type of events to hold via the app and what kind of events that should be prioritized.

4. Usage of social media platforms to get notified about an event

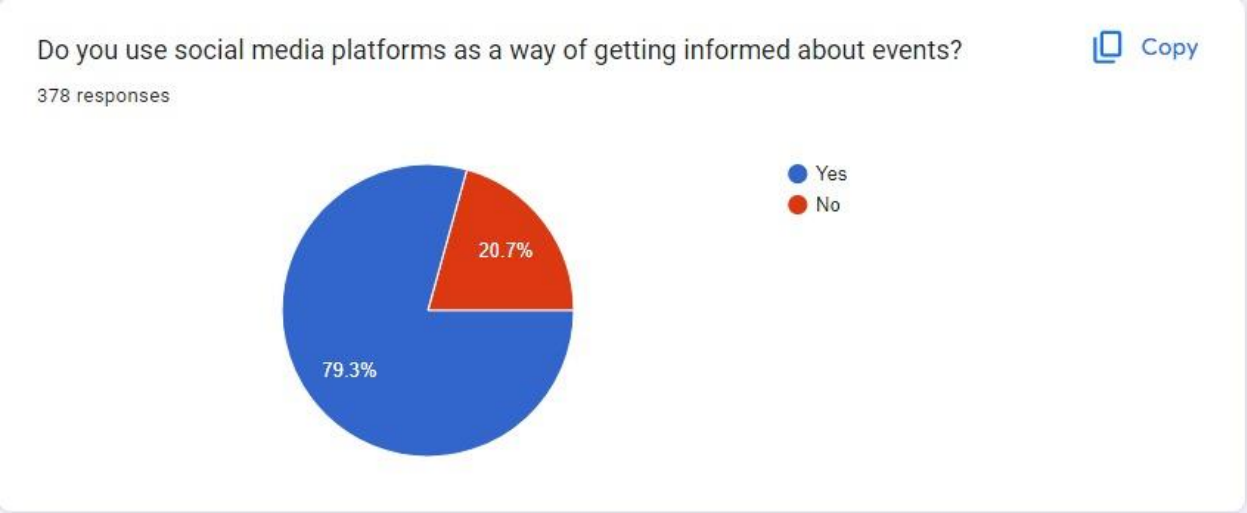

Figure 6 : Usage of social media platforms to get notified about an event

The majority of the participants, if not 79.3% of the participants responded positive to social media platforms as a way of getting informed about events. Only 20.7% of the participants are not using social media as a way of getting informed about events. To the people who currently use social media as a way of getting informed about events can have more improved benefits from this app while the others can get introduced to the app and start enjoying benefits of the app.

1. Likeliness to attend to an online hosted event.

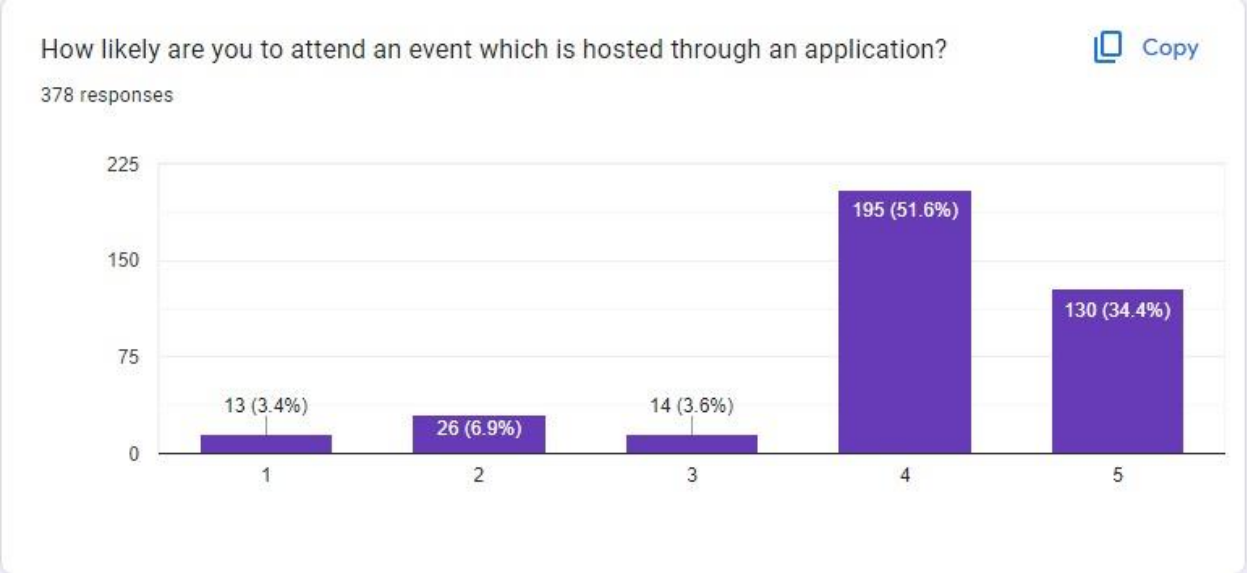

Figure 7 : Likeliness to attend to an online hosted event.

Even if the events are hosted through an application, it is not effective if the users are not attending the suggested events. Currently, 51.6% of participants rated 4 which means 80% likeliness in attending events hosted trough applications. Our goal is to get this numbers up and make most of the people participate events suggested by the application.

1. Use of the application

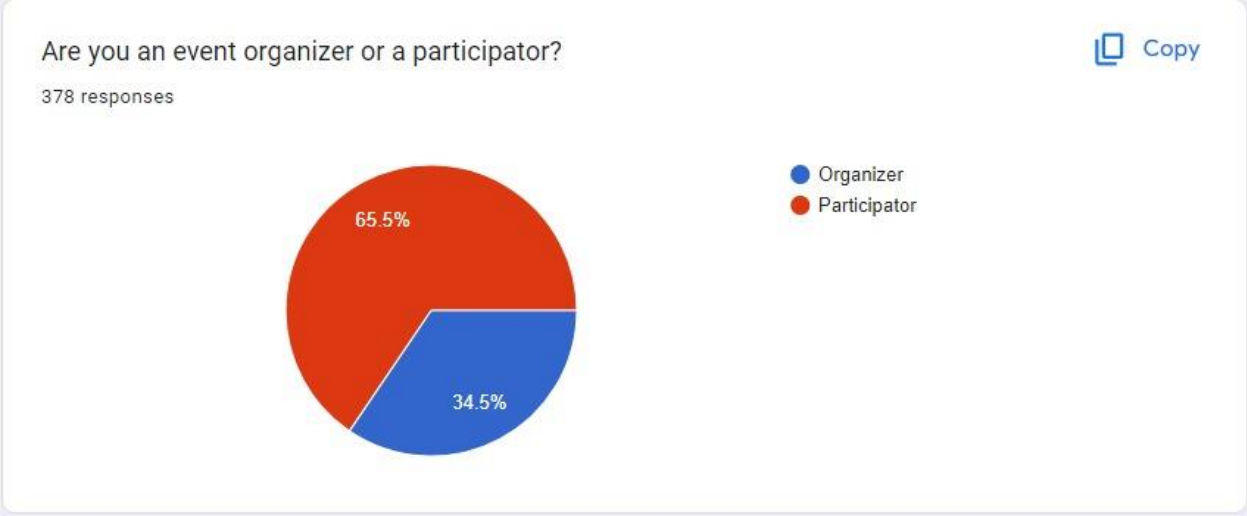

Figure 8 : Use of the application

There are two types of users to this type of application.

1. Organizers
2. Participants

Organizers are treated in a special way in order to optimize their businesses through the data and analysis provided by the application while participants can get suggestions according to their preferences. With this data, we can get a basic idea of the ratio of organizers to participants.

2. Preferred event type

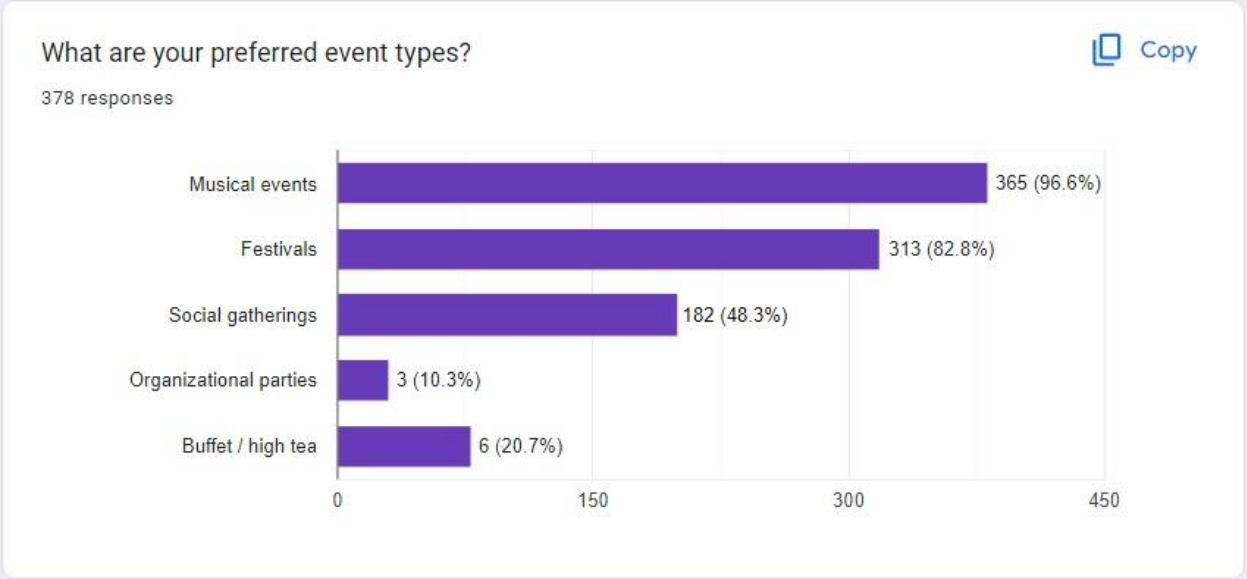

Figure 9 : What are your preferred event types

According to the survey results, the most popular event type is musical events, which 96.6% would agree. However, the results can vary depending on the age, gender and the users' preferences. Apart from the musical events, festivals, social gatherings, buffet / high tea events and organizational parties are the next most popular events.

3. Expectations from a community

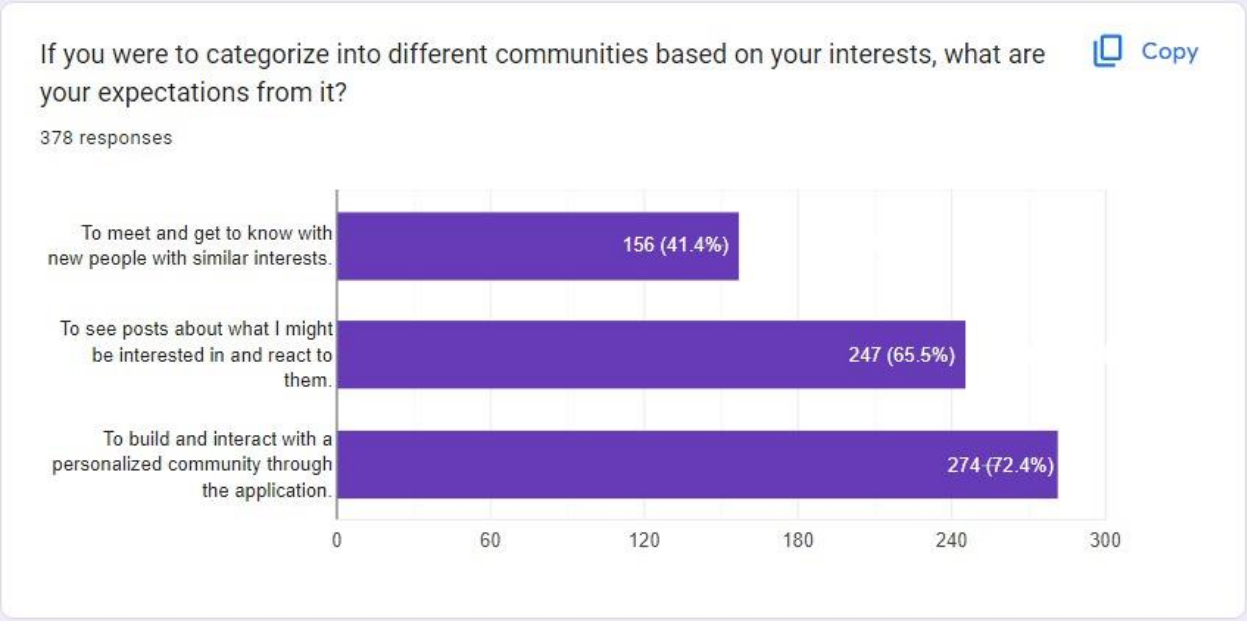

Figure 10 : Expectations from community

Another main thing to consider is what are the expectations of the application. 72.4% of the participants have responded that they want to build and interact with a personalized community through the application. 65.4% of the participants have responded tat they want to see posts about what they might be interested in and react to them. 41.4% of the participants have responded that they want to meet and get to know new people with similar interests.

1.2 Literature Survey

By conducting a literature survey, we found several similar projects. One notable project in the area of community-based recommendations is the Yelp app. Yelp utilizes user behavior analysis data to categorize users into relevant groups based on shared interests, such as proximity to places and restaurants. The app also features a feed section that suggests posts based on community interests, allowing for an improved user experience. Yelp's recommendation system is highly effective, with users reporting a high degree of satisfaction with the app's personalized recommendations.

Another relevant project is the Airbnb app. Airbnb utilizes a similar recommendation system that categorizes users into relevant groups based on shared interests such as location and price range. The app features a personalized feed that suggests listings based on user preferences, increasing the likelihood that users will book listings that match their needs.

These applications use community based recommendation systems for various reasons. 'Engage Solutions Group' uses a community feed for membership organizations or charity, grouping communities in to clusters using common interests, providing a social network to broadcast information. 'Appzaloot' provides a feed based on user activities by proximity. And also gives emergency alerts to the community. Using topic based feeds 'GetSocial's' users will be able to follow in order to make a personalized timeline. Amity is using activity feeds based on the community and influencer live feeds broadcasting to make a more user centric community feed. 'HigherLogic' lets users change their community feed using many filters generated by groups made for different communities. Shows a custom tailored community feed for each and every user which changes depending on user analyzing methods and changes after each and every login (explore page). 'Buffer' is based on the followed accounts and prioritizing depending the timeliness also the time spent on a post using a machine learning algorithm. Also orders some feeds by how recent it appeared in the community.

Recent research in this field has also focused on developing more sophisticated recommendation algorithms. For example, this paper [9]. Proposes a novel recommendation algorithm that utilizes constrained non-negative matrix factorization to generate more personalized recommendations.

Within the framework of information systems research, which focuses on how information technologies can influence and support decision processes, the researchers in this study looked at the decision-making process. Particularly in community-based, Free-Libre / Open Source Software projects with internal governance structures where team members make decisions virtually, asynchronously, across different time zones, and almost exclusively via information systems, information technologies are known to influence and support decision processes. Understanding the decision-making processes involved is crucial to enable virtual, asynchronous decision-making across many time zones and locales. Only after that can suitable new information technologies be found and created to aid the process. [11]

Other recent research has focused on improving the quality and relevance of recommendations by incorporating additional user data such as social network connections and online behavior. The paper [10] provides an overview of the latest research in this area and discusses some of the key challenges and opportunities for future research.

1.3 Research Gap

In contrast to traditional community-based recommendation systems, our focus is on utilizing community feeds to promote current events organized by registered organizations such as buffet events in hotels, special events in clubs, karaoke nights in restaurants, and musical shows in cafes, while avoiding irrelevant content based on user behavior identification. By utilizing react buttons and counting values, we prioritize the feed based on events that are most favored by the community and align with the user's interests. This will prioritize the feed based on the events that has most timely value and the user interests as a whole. This feed will only show the local events for a user to offer more accurate information. The key factors that we are hoping to filter data is the timely value of the content, Highly rated by the community, by avoiding disliked user preferences and separating content based on the fact weather it is in users spending capacity or not.

The field of community-based recommendations has seen significant advancements in recent years, however, we have identified some potential gaps that still need to be addressed. One key gap is the development of recommendation algorithms that can effectively address the problem of cold-start. This occurs when a new user joins the platform, and there is not enough data available to make accurate recommendations. To overcome this issue, we are planning to use techniques such as active learning. Active learning's main objective is to direct the user's preference elicitation process by asking them to score only the items they believe to be the most informative from the recommender's perspective. This is accomplished by examining the information at hand and determining the value of the data points. [12]

By employing interface agents, the cold start issue can also be solved. By "watching over the shoulder," these bots often "learn" the user's preferences implicitly by identifying trends in the user's behavior. Before the agent can make any user-specific adjustments, though, it can take some time. Even then, it would only be able to help with things that it has already seen the user doing. We intend to add a component of collaboration among the agents helping different users to get around this. By asking other agents to contribute what they have already learnt from their individual users, novel circumstances can be handled in this way.

In addition, In order to create a hybrid content-based filtering, we intend to apply hybrid feature weighting, in which the features of either the objects or the people are weighted in accordance with the user's estimation of importance. By incorporating these methods, we aim to provide a more accurate and personalized recommendation system that can effectively address the cold-start problem and improve user experience in community-based event recommendations. Another gap we identified is the integration of more diverse and nuanced user data to improve the quality and relevance of recommendations. For example, incorporating user sentiment analysis or leveraging user-generated content to provide more accurate and relevant recommendations could be an area for future research. In order to overcome this we are hoping to improve the quality and relevance of recommendations, we explored that integrating more

diverse user data, such as user-generated content, sentiment analysis, and other types of data that are not currently being used.

In order to provide effective recommendations to users of our application, we plan to collect initial user data through a form during the first boot of the application. This data will then be compared with the existing user data in the community to identify users who share similar attributes. Based on this comparison, we will make recommendations that are tailored to the preferences and interests of the individual user.

To accomplish this, we will rely on a hybrid recommendation approach, which combines multiple recommendation models in order to mitigate the disadvantages of any one model. By doing so, we aim to provide more accurate and diverse recommendations that take into account different aspects of the user's preferences and interests.

By using this, we can take advantage of the strengths of multiple recommendation models, such as content-based, collaborative filtering, and knowledge-based recommenders. This allows us to provide a more comprehensive and accurate recommendation system, as each model contributes its unique perspective to the overall recommendation process.

This component we suggest will be able to utilizes user behavior analysis data in previous component to categorize users into relevant groups based on shared interests. The component also filters posts by verified users with the help of features in socialization component and uses an ML algorithm to prevent disliked posts and posts similar to those from appearing in the community feed.

This component is the place where individual users we get from user behavior component meets their community and get improved by the data gathered in socialization component, then feeds that data to the ML algorithm to make improved decisions helping the profit maximization and socialization components by providing categorized user community behavior data for businesses to improve their profits. Data gathering of this component can be done by doing a survey, mobile data such as search history and app usage and also by using a web analytic tool (Google analytics). This data can include information such as page views, bounce rates, and time spent on a page.

Features	AirBNB	Yelp	AppZaloot	GetSocial	Buffer	HigherLogic	Proposed system
Collaborative filtering algorithms	✗	✗	✓	✓	✓	✓	✓
Content-based filtering algorithms	✓	✓	✓	✓	✗	✓	✓
Hybrid filtering	✗	✗	✗	✗	✓	✗	✓
Machine learning models	✓	✗	✗	✗	✗	✓	✓
Similarity calculation system	✗	✓	✗	✓	✗	✗	✓
Review and recommendation system	✓	✓	✓	✓	✓	✗	✓

Table 1 : Proposed system compared to existing systems

1.4 Research problem

The focal point of this project is to examine the impact of feeling isolated and overwhelmed in a new environment. When individuals move to a new city, country, or unfamiliar surroundings, they often encounter challenges adapting to their new lifestyle. The lack of social connections, unfamiliar surroundings, and insufficient knowledge of the new environment can lead to feelings of isolation and loneliness, causing them to withdraw from social interaction. This can have a detrimental effect on an individual's mental health, resulting in stress, depression, and related issues.

In the current market, most applications do not offer businesses the ability to view customer communities and statistics that are customized to specific groups. This feature is necessary for addressing large audiences by grouping them accordingly. Moreover, these applications do not focus on enhancing real-life user interactions by assisting users in finding their respective communities and creating a platform for them to interact with each other, even when they are distantly located.

Furthermore, there are no social media platforms that employ advanced verified user techniques to authenticate users based on their interaction with communities, the reactions of other users to their posts, and the user's level of activity and influence within their community. By taking into account these crucial factors, our community-based recommendations are considerably different from those of our competitors.

The current entertainment finding applications available in the market fail to provide a personalized solution to this issue. Although these applications list all the entertainment options available, the information is not customized to the user's preferences and interests, resulting in an overwhelming sense of difficulty in choosing what to do, which often leads to staying at home.

Recommender systems encounter a significant obstacle when the suggested items become too alike. However, the most crucial challenge that these systems face is the ever-changing nature of the data they use, which tends to be subjective and often struggles to handle new or unfamiliar recommendations. [13] Although many recommendation systems rely on user data or analyze their past behavior, this approach is not always effective, as user trends and interests are constantly evolving. Thus, relying solely on past behavior analysis for good recommendations becomes impractical, and the recommendation system needs to adapt to changes in the data environment. Based on our research, we have found that this presents a significant hurdle for recommender systems, as they struggle to react in a rapidly changing data environment.

Another aspect to consider in the business end is, where applications on the market that allow businesses to promote their services do not incorporate the personalized approach mentioned above. Therefore, there is no one-stop application available that addresses all these issues, hindering their widespread acceptance. This has been a significant reason why businesses fail, as they often invest in the wrong areas without adequate data or statistics to assist them in making informed decisions.

2 OBJECTIVES

2.1 Main Objectives

The primary objectives of the component are to enhance users' social connections by categorizing them based on shared interests, suggesting posts according to community interests, filtering posts by verified users, and ultimately rendering the system more enticing to users. Additionally, the component aims to render unfamiliar surroundings more familiar to users while maintaining their psychological well-being.

2.2 Specific Objectives

1. Implementing a mobile application as an entertainment platform.

The proposed solution involves the design and implementation of a mobile application dedicated to providing an entertainment platform with a specific section for user communities. This application should include features such as a profile feature, content catalog feature, similarity calculation feature, hybrid filtering feature, and social features to achieve the intended goal.

2. Building a model for recommending most suitable event using an algorithm.

The objective is to develop a model that recommends the most suitable events to users based on their preferences, such as timeliness, cost, and social relevance. By analyzing user behavior data, we can identify user preferences and map them to available event lists to present users with a concise list of events that best match their needs.

3. Building a model for recommending most suitable community for a user by using an algorithm.

The proposed model involves building an algorithm that recommends the most suitable community for a user based on their preferences. After analyzing user behavior, users will be grouped into main categories to assign them to relevant communities, helping them to become familiar with unfamiliar surroundings. With the help of this algorithm, users will receive personalized notifications, suggestions, and a personalized feed.

4. Identify what user preferences are.

The goal is to identify user preferences by analyzing their behavior. This includes parameters such as geographical locations, hotels, events, and other users with whom they would like to interact more. The algorithm will process the data gathered by tracking user activity within the application to develop a deeper understanding of the user.

5. Retrieving user location data using google API

The location data of users will be tracked with their explicit permission to gain insights into the places and events that they are most likely to visit, as well as to identify other users who share similar interests in the same geographical area. This data can be accessed via Google Maps API endpoints.

6. Building a model for notifying businesses about the important information such as trends and predictions by using an algorithm.

Through the use of an algorithm, business users will have access to critical business information, such as current trends, competition status, business forecasts, and recommended actions to maximize business performance. Additionally, a monthly dashboard report will be provided to users, offering further insights into the market through advanced analysis.

3 METHODOLOGY

Night-Out is an event management application with 4 components,

1. User behavior analyzation system.
2. Community based recommendation system.
3. Socializing process and reviews system.
4. Profit maximization system.

In this proposal, we specially focus on the Community based recommendation component. The main objective of this component is to enhance users' social connections by categorizing them based on shared interests, suggesting posts according to community interests, filtering posts by verified users, and ultimately rendering the system more enticing to users. Additionally, the component aims to render unfamiliar surroundings more familiar to users while maintaining their psychological well-being.

To achieve this we develop four modules within the component;

1. Content catalog: This module is responsible for storing the content that will be used for recommendation generation. The process involves the following steps:
    - The module identifies which data is essential to make recommendations.
    - The system fetches the dataset.
    - The dataset is saved in a traceable form to ensure its integrity and accessibility.
    - The best matches are sorted out to be used for the current recommendation.
    - The results are returned to the recommendation generation module.

2. Similarity calculations: Responsible for calculating the similarity between users based on their preferred content. The process involves the following steps:
    - User inputs are collected to determine their preferences.
    - The system retrieves the available item list.
    - A comparison is made between the user inputs and the item list to identify commonalities.
    - The similarity between user preferences and the content list is calculated.
    - The results are saved to prioritize items based on user preferences.

3. Review system: Enables users to react, interact, and provide feedback through the system. The system works through the following steps:
    - A post feature is implemented to allow users to share their opinions and experiences.
    - Image upload support is added to posts, enabling users to add relevant visuals to their posts.
    - Posts can be edited or deleted to ensure that the information presented is accurate and up-to-date.
    - User posts are visible in user profiles and to all users, allowing for increased visibility and interaction.
    - A reply feature is implemented for posts, enabling users to engage in discussion and exchange feedback.

4. Recommendation generation: This operates based on the modules and content-based filtering as mentioned earlier. The process involves the following steps:
    - Pre-processed data is collected from the above-mentioned modules.
    - Content-based filtering is implemented to analyze the data.
    - The data set is filtered based on the results obtained from content-based filtering.
    - Similarity conditions are checked to ensure that the recommendations are relevant to the user.
    - Recommendations are generated and presented to the users.

To complete the project, we want to apply the agile development methodology. This strategy places a strong emphasis on adaptability, teamwork, and quick iteration. It is based on the Agile Manifesto, which identifies four values: valuing people over processes and technologies, valuing working software over thorough documentation, valuing customer collaboration over contract negotiations, and valuing adapting to change over sticking to a schedule.

Agile methodologies are distinguished by brief development cycles, known as sprints, when cross-functional teams collaborate to create usable software or products. To make sure that the product satisfies their needs and that modifications can be made rapidly in response to input, the teams work closely with the customer or end-user. Continuous improvement is another key component of the agile process, which includes regular reviews and retrospectives to find areas for improvement. The seven phases of agile model;

1. Planning: This phase involves identifying the scope of the project, defining the project goals, and creating a roadmap or backlog of tasks that need to be completed.

2. Analysis: In this phase, the team conducts a detailed analysis of the project requirements, user needs, and potential risks.

3. Design: Based on the analysis, the team designs the software or product, identifying features, functionalities, and user interfaces.

4. Implementation: This is the phase where the actual development work takes place. The team works on coding, testing, and integration of different modules.

5. Testing: The team performs a variety of tests throughout this phase, including user acceptability testing, integration testing, and unit testing, to make sure the software or product satisfies the necessary quality standards.

6. Deployment: To make sure the software or product satisfies the necessary quality standards, the team does numerous sorts of testing throughout this phase, including unit testing, integration testing, and user acceptability testing.

7. Monitoring: The final phase involves monitoring the software or product in production to identify and fix any issues, and continuously improve the product.

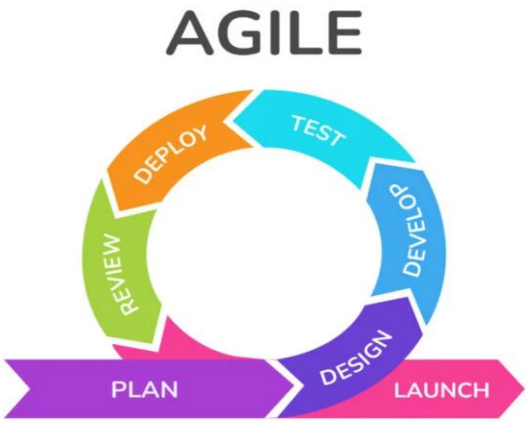

Figure 11 : Agile model

3.1 requirement gathering and feasibility studying

We gathered the requirements at two levels

01. Primary data gathering
02. Secondary data gathering

In primary data gathering, we mainly focused on user requirements. We are planning conducted a background survey through google forms to identify user requirements and the questions we are hoping to ask are mentioned bellow.

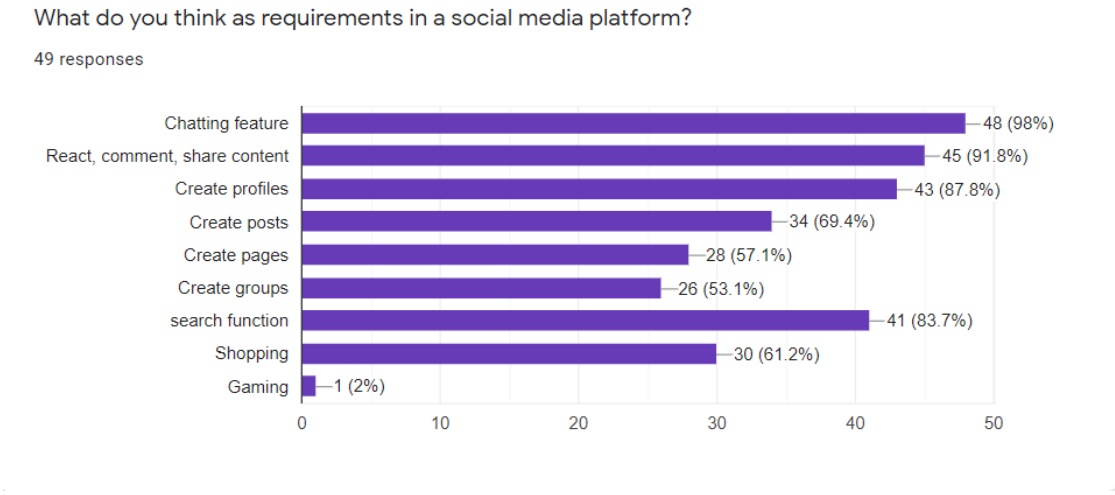

Figure 12 : Requirements in a social media platform

Figure 13 : Survey participants' ratings on each social media platform requirement

In addition to the questionnaire,

- we acquired data from event planners and consultants and gathered requirements.
- Contacted with an IT consultant and gathered information.

In secondary data gathering,

- We studied existing systems
- We studied from various online resources such as online tutorials and web articles.
- We also gathered information from books and articles.

After performing requirement gathering, we performed a feasibility study,

1. Technical Feasibility

To successfully complete the research, all the team members should have the technical knowledge to proceed with the project. We made sure that we can acquire the required knowledge in order to complete the project addition to we already acquired knowledge.

2. Economic Feasibility

Financial resources are very important when we conduct the project. We made sure we have enough funds in order to complete project without having to stop half the way. We also made sure to plan handling unforeseen financial needs in the future.

3. Legal Feasibility

Not meeting legal feasibility is when a project runs afoul of legal restrictions such as zoning rules, data privacy laws, or social media laws. We made sure there are no conflicts with laws in our proposed system.

4. Operational Feasibility

This involves to what extent the project can be completed to meet the needs of the company. We had a discussion with Underground Music Coven members and made sure we are feasible in operational feasibility.

5. Scheduling Feasibility

Scheduling Feasibility means if a project can be completed and delivered in defined time. In our case, it is 1 year. We made sure the project is deliverable in the defined time period.

Process of gathering secondary data for our research.

We undertook various activities. These included studying existing systems, referring to online resources such as tutorials and articles, as well as gathering information from books and articles. After completing the requirement gathering phase, we conducted a feasibility study to determine the viability of our proposed project. The feasibility study encompassed several key areas;

1. Starting with technical feasibility: We ensured that all team members possessed the necessary technical expertise to successfully complete the project, and also took steps to acquire additional knowledge as required.

2. Next, we assessed economic feasibility: recognizing the critical role of financial resources in the success of the project. We confirmed that we had sufficient funds to complete the project and also developed contingency plans to manage any unforeseen financial challenges.

3. In addition, we addressed legal feasibility: ensuring that our proposed system did not run afoul of any relevant laws or regulations, such as those pertaining to data privacy or social media.

4. We also considered operational feasibility: which refers to the ability of the project to meet the needs of the company. We are planning to work closely with the businesses such as hotels in order to acquire more information regarding this area.

5. Finally, we evaluated scheduling feasibility: which relates to the project's ability to be completed and delivered within the defined time frame. Given that our project timeline was set at one year, we ensured that our proposed project could be delivered within this timeframe.

3.2 Analyzing

By analyzing the gathered data, we categorized collected requirements as follows

3.2.1 Functional Requirements

- Based on similar interests, the system should be able to analyze user behavior data and classify people into pertinent categories.
- The system should have a feed section that suggests posts based on community interests.
- Users should be able to interact with the posts by commenting.
- The system should filter posts by verified users and prevent disliked posts and posts similar to those from appearing in the community feed.
- The system should be able to gather data through mobile data such as search history and app usage, and web analytic tools such as Google analytics.

3.2.2 Non-Functional requirements

- The system should be able to handle large amounts of data and provide fast and reliable responses to user requests.
- The system should ensure that user data is kept secure and only accessible by authorized personnel.
- The system should be able to scale up or down based on changing user demands and data volumes.
- The system should be easy to use and navigate for users of all technical levels.
- There should be little downtime for maintenance or updates, and the system should always be dependable.

3.2.3 User requirements

1. The system should be user-friendly and easy to navigate, with clear instructions and guidance provided to the user.
2. The system should allow users to create profiles with basic personal information such as name, age, and location.
3. The system should enable users to connect with other users who share similar interests or are located in the same vicinity.
4. The system should provide users with relevant and timely recommendations for events, activities, and other content based on their interests and location.
5. The system should allow users to interact with posts by commenting, liking, or sharing, and also enable them to report inappropriate or offensive content.

3.2.4 System requirements

Software requirements

- Operating System: Windows
- Web browser: Google Chrome
- Database management system: Fire base
- Programming languages: Python, JavaScript, and PHP
- Frameworks: React, Django, and Node.js
- Development environments: PyCharm, PhpStorm, NumPy, pandas
- Version control system: Git
- Application programmable interfaces: Android studio

Hardware Requirements

- Processor: Intel Core i5 or similar AMD series CPU
- Memory (RAM): 8 GB
- Storage: 256 GB Solid State Drive (SSD)
- Display: 15-inch 1080p HD
- Graphics card: NVIDIA GeForce GTX 1650 or equivalent
- Internet connectivity: Wi-Fi 5 or Ethernet connection

3.3 Design

To proceed with the design phase, we have developed a system architecture diagram to consolidate all necessary components. The design phase will commence by wireframing each interface of the web application using Figma software. Upon completion of the wireframes, usability tests will be conducted using Hi-fidelity prototypes, with a focus on identifying and resolving issues from the user's perspective. This process will be efficient and effective, as it will save time and effort in advance of the implementation phase by reducing the risk of failing user acceptance testing. Subsequently, we will design the system's structure, starting with attribute identification and database design, before moving on to designing the hardware and software solutions.

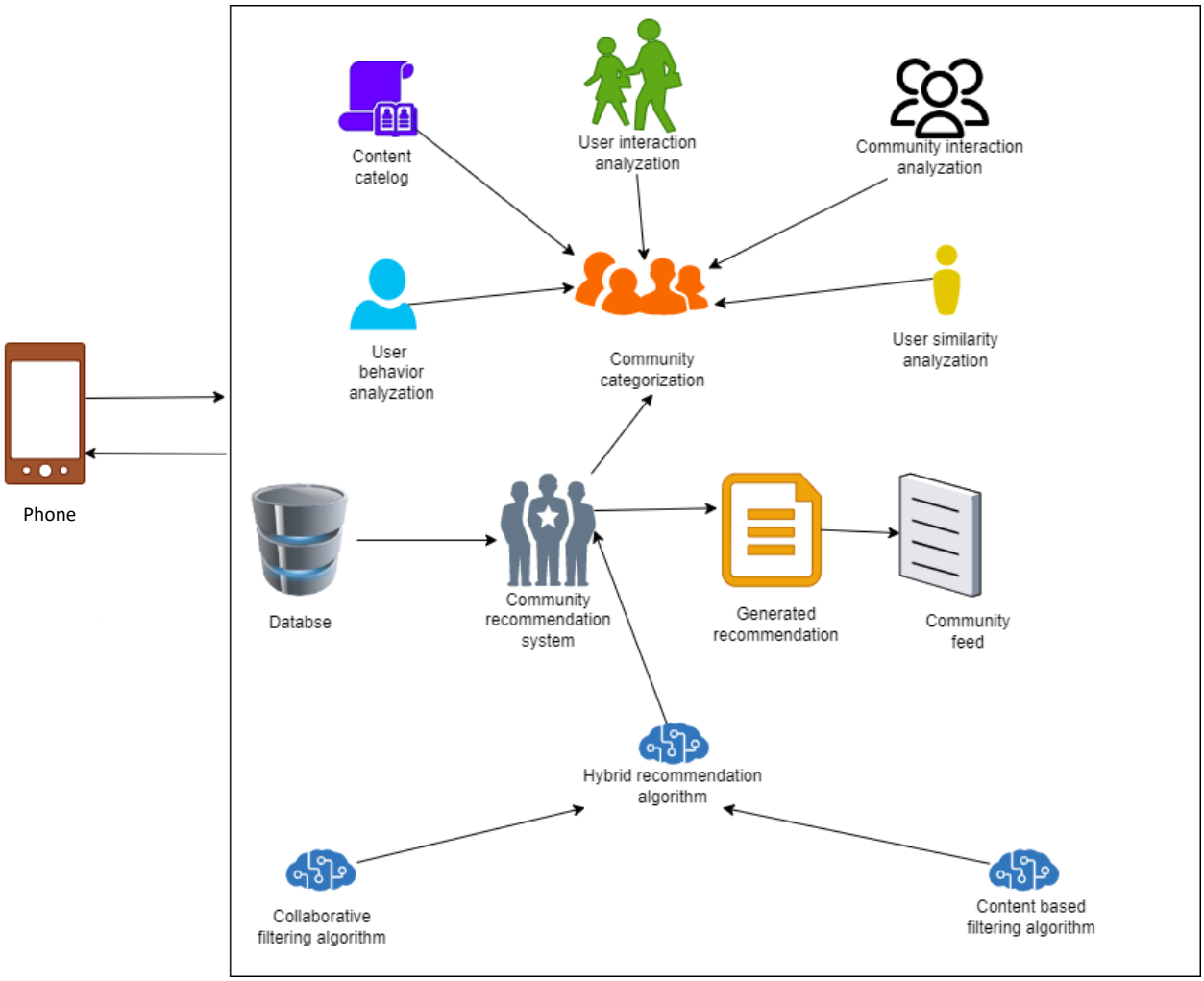

Figure 14 : High level system architecture diagram for proposed component

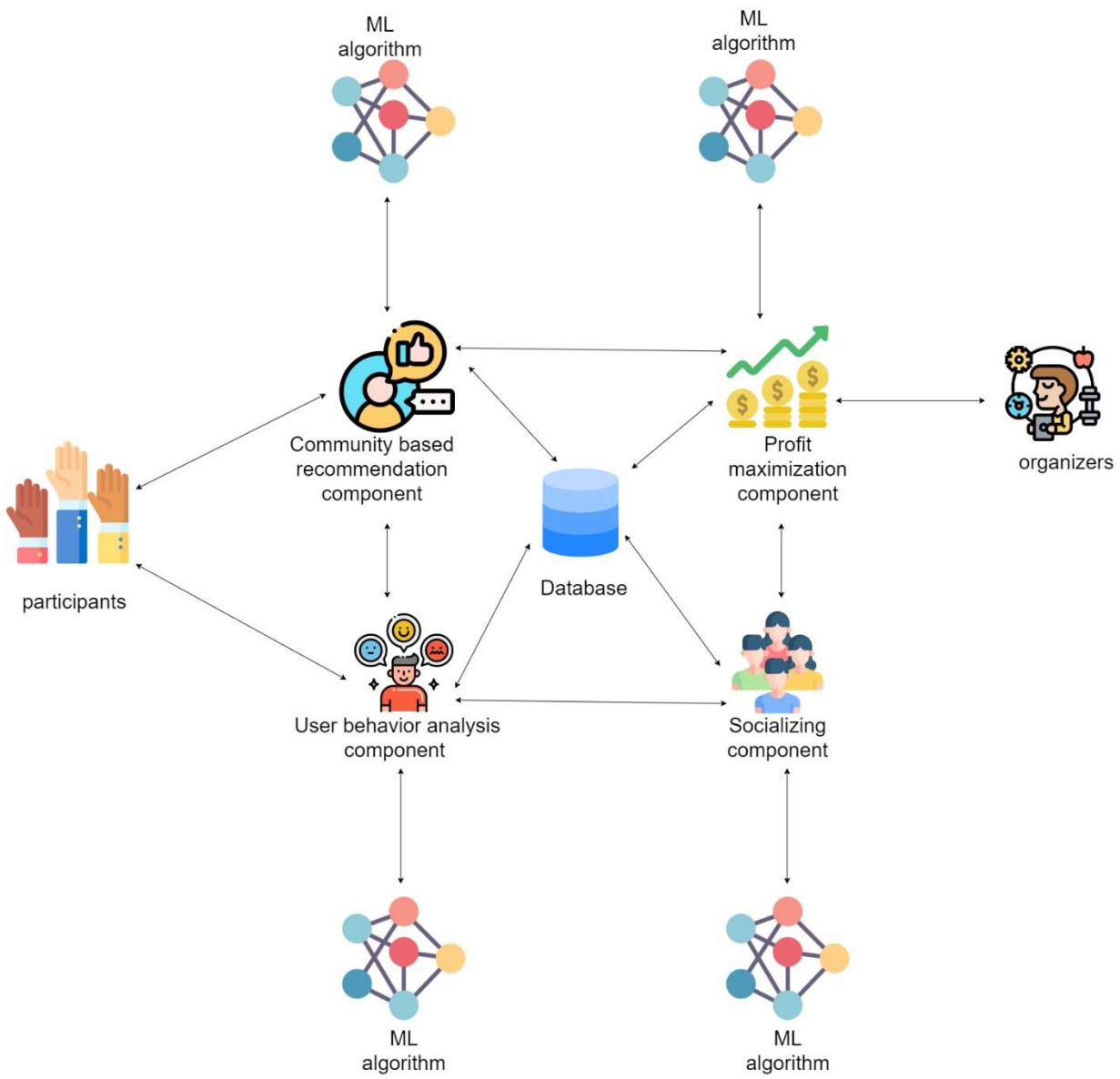

Figure 15 : High level system architecture diagram for the whole system

3.4 Implementation

This phase represents the realization of all ideas generated in the previous stages. Any modifications made at this juncture can have far-reaching implications. As per the Agile methodology, any alterations made to the process can result in repetition.
We are hoping to develop four modules,

We develop four modules within the component;

1. Content catalog: This module is responsible for storing the content that will be used for recommendation generation.

2. Similarity calculations: Responsible for calculating the similarity between users based on their preferred content.
3. Review system: Enables users to react, interact, and provide feedback through the system.
4. Recommendation generation: This operates based on the modules and content-based filtering as mentioned earlier.

A step-by-step guide to implementing a community-based recommendation system using a hybrid recommendation algorithm:

1. Identify the objectives: Determine the goals of the recommendation system, such as increasing engagement, user retention, or sales. Also, determine the specific types of recommendations that will be provided, such as content, products, or services.

2. Collect data: Collect user data, such as browsing history, preferences, and demographic information, to build a user profile. Also, gather item data, such as descriptions, features, and metadata, to build an item profile.

3. Preprocess data: Clean the data and transform it into a format suitable for analysis. Also, partition the data into training and testing sets.

4. Choose algorithms: Select the algorithms that will be used for collaborative filtering and content-based filtering. This could include techniques such as k-nearest neighbors, matrix factorization, or deep learning.

5. Train models: Train the recommendation models using the training data. This involves optimizing the model parameters to minimize prediction error.

6. Evaluate models: Evaluate the recommendation models using the testing data. This involves measuring the accuracy and performance of the models using metrics such as precision, recall, and F1 score.

7. Combine models: Using a hybrid recommendation system, combine the collaborative filtering and content-based filtering algorithms. This might entail methods like feature combining, weighted averaging, or cascade models.

8. Implement the system: Implement the recommendation system by integrating the trained hybrid model into the community-based recommendation component of the application. This could include creating a user interface for displaying recommendations, integrating with the item catalog, and setting up recommendation triggers.

9. Test and refine: Test the system with a subset of users and gather feedback on the recommendations. Refine the system based on user feedback, such as adjusting the algorithm parameters, improving the item catalog, or providing more personalized recommendations.

10. Monitor and update: Continuously monitor the recommendation system and update it as necessary. This could involve retraining the models with new data, improving the data quality, or adapting the algorithm to changing user behavior.

3.5 Software Testing

Following the implementation phase, the software testing phase commences, where errors and bugs that occur during program execution are identified. Each subcomponent is to be thoroughly tested in this phase. The testing phase can be categorized into two main types;

1. Functional Testing: This includes user acceptance testing, unit testing, integration testing, and component testing. For this, both white box and black box testing techniques should be used.

a. Unit Testing: To ensure appropriate operation, each component is tested in this manner.

b. Component Testing: While evaluating a piece of software separately from the rest of the system, it is similar to unit testing.

c. Integration Testing: This is to test the application's proper functioning when the components are integrated.

d. User Acceptance Testing: This is a type of functional testing where the end user verifies the system meets their requirements.

2. Non-Functional Testing: Performance testing, usability testing, and security testing are all included in this.

a. Performance Testing: This measures reaction times, identifies bottlenecks, and pinpoints failure locations to assess the system's performance.

b. Usability Testing: This is done with end users to determine whether the user experience of the system is optimal.

c. Security Testing: This checks the software for flaws that may compromise data.

Both functional and non-functional testing are to be conducted simultaneously.

3.6 Maintenance

The process of software development does not terminate at the completion of testing. Upon completion of development and launch, the software must be continuously maintained. The software should be updated to address security vulnerabilities, performance issues, bugs, and accuracy concerns to ensure that it operates at its optimal level.

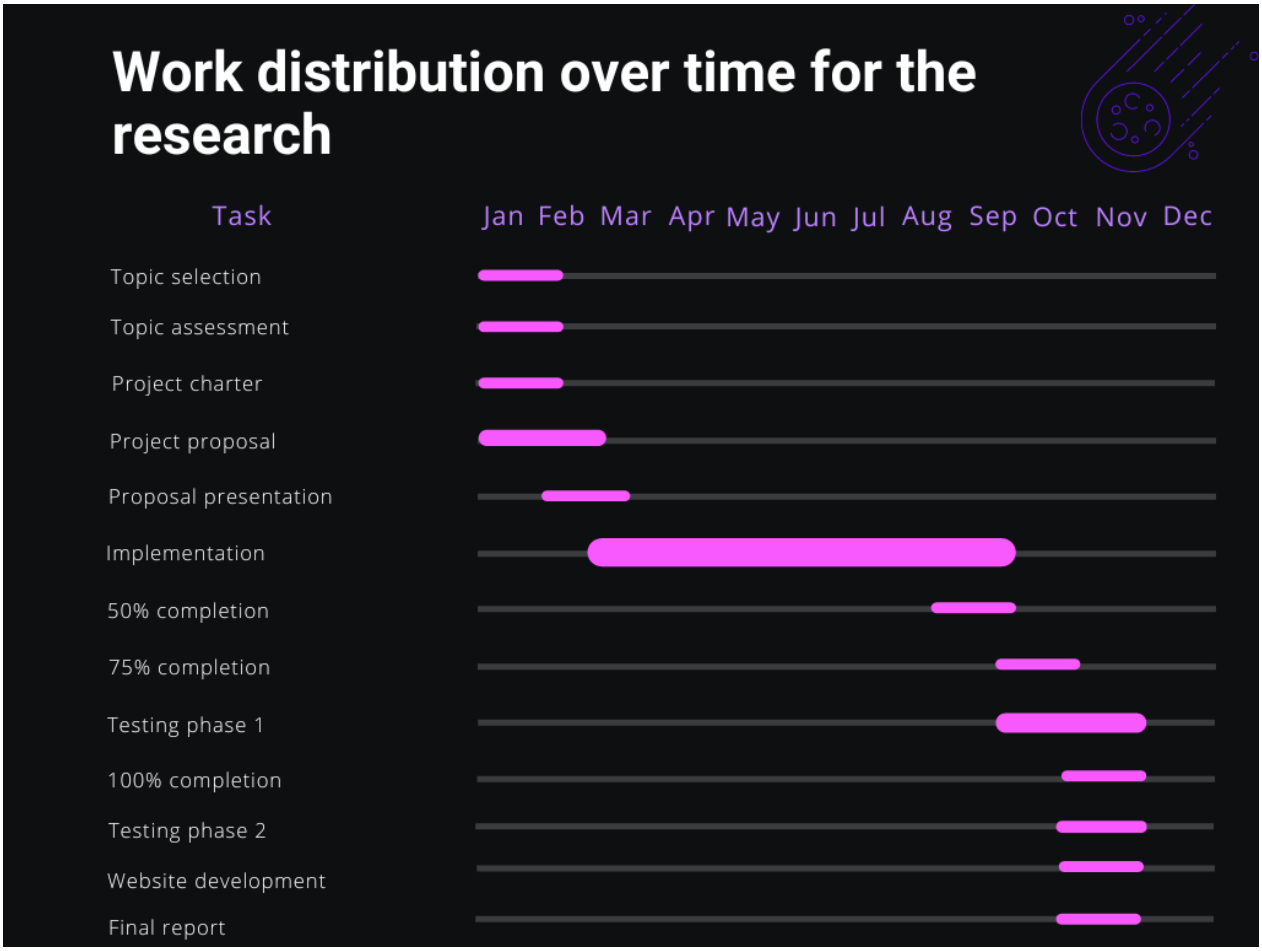

Figure 16 : Gantt chart

4. COMMERCIALIZATION

The proposed social media platform includes four main components,

1. User behavior analyzation system.
2. Community based recommendation system.
3. Socializing process and reviews system.
4. Profit maximization system.

Key considerations for commercializing the component and the strategies that can be employed to promote the product and achieve sustainable growth. The first step in commercializing the component is identifying the target market. The component is likely to appeal to a broad range of users who are interested in exploring local events, restaurants, and other community activities. Targeting specific demographics, such as millennials, urban professionals, or food enthusiasts, can help refine the marketing approach and maximize the impact of promotional efforts.

An effective marketing strategy is essential for promoting the component and generating interest among potential users. This may involve leveraging social media platforms to reach a wider audience, partnering with local businesses and organizations to sponsor events and activities, and engaging with influencers and bloggers to promote the product. The marketing strategy should be tailored to the target market and should focus on the unique value proposition of the component, such as the personalized recommendations and socialization features.

This component can generate revenue through various streams, such as advertising, sponsorships, and affiliate marketing. Advertising can be integrated into the feed section of the product, allowing businesses to promote their products and services to targeted audiences. Sponsorships and affiliate marketing can be used to promote events, restaurants, and other local activities, generating revenue through referral fees or commissions.

Continuous user feedback is essential for improving the product and ensuring customer satisfaction. This component will include mechanisms for collecting and analyzing user feedback, such as surveys, ratings, and reviews. This feedback can be used to identify areas for improvement, such as adding new features or refining the recommendation algorithm, and to gauge user satisfaction and loyalty.

This requires a comprehensive approach that considers the target market, marketing strategy, pricing model, revenue streams, and user feedback. By carefully planning and executing each of these steps, the product can be successfully launched and adopted in the market, generating revenue and delivering value to users.

4.1 Commercialization plan

1. Target Market Identification

Our community-based recommendation system is designed for individuals interested in exploring local events, activities, and connecting with like-minded people. The target audience includes;

1) Urban professionals looking for social interaction and enjoyment.
2) Millennials seeking recommendations for tailored events.
3) Foodies seeking out new culinary adventures.
4) New residents, including tourists and recent immigrants.

2. Market Research

We will conduct thorough market research to better understand our target audience and competitors. Key aspects of our research will include;

1) To make our recommendation algorithms more accurate, we analyze user preferences and behavior.
2) The unique selling propositions (USPs) of each competitor in the local event recommendation market should be identified.
3) Keep abreast on new developments in social networking and finding local events.

3. Marketing Strategy

Our marketing strategy will encompass a range of approaches to reach our target audience effectively;

1) Use social media sites like Instagram, Facebook, and Twitter to your advantage to produce interesting content, place targeted adverts, and engage with prospective customers.
2) Work together to find sponsorship options and cross-promotional opportunities with neighborhood businesses, event planners, and civic organizations.
3) Work together with bloggers and local influencers to highlight the advantages of the application.
4) To draw and keep users, produce useful material such as event guides, local highlights, and user stories.
5) Improve your app store listings for the most downloads and visibility possible.

4. Revenue Streams

To ensure the sustainability of our recommendation system, we will implement various revenue streams;

1) Local companies can advertise their goods and services within the app through native and display advertising.

2) Join forces with venues and event planners for sponsorship opportunities, such as highlighted event listings and advertising.
3) Promote nearby companies and gain commissions or referral fees for directing customers to them.
4) Offer a subscription-based service with premium features, such as improved suggestions, ad-free browsing, and exclusive access to events.

5 RESULTS AND DISCUSSION

Community Formation Using K-Nearest Neighbors Algorithm;

The K-Nearest Neighbors (KNN) algorithm was used to construct user communities as we provide the findings of our community-based recommendation system in this part. To support our decision to use KNN for community creation, we also give a comparative study of similarity scores generated from collaborative filtering and content-based filtering methods.

Community Formation Using KNN Algorithm;

We used the KNN algorithm to identify users who used the Night-Out application similarly based on their preferences and behavior. Based on their past interactions with events and activities, we computed similarity scores to measure how similar users are to one another. The KNN algorithm was set up to take into account a user's k-nearest neighbors, where k is the number of neighbors that should be taken into account.

Similarity Score Calculation;

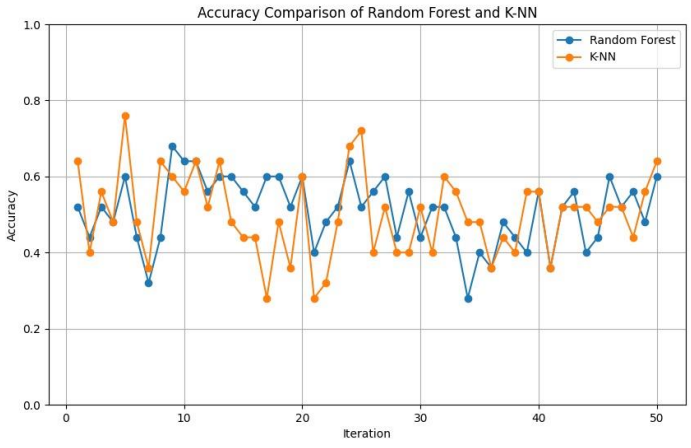

Figure 17 : K-NN

We used a user-item interaction matrix, where rows stand for users and columns for events or activities, to calculate similarity scores. A measure of user involvement with a particular event is contained in each cell of the matrix, such as the frequency with which a user attended or evaluated the event. We tested a number of similarity metrics, including Pearson correlation, cosine similarity, and Euclidean distance. Particularly, cosine similarity showed the best performance in capturing the connections between users.

Comparison with Collaborative and Content-Based Filtering,

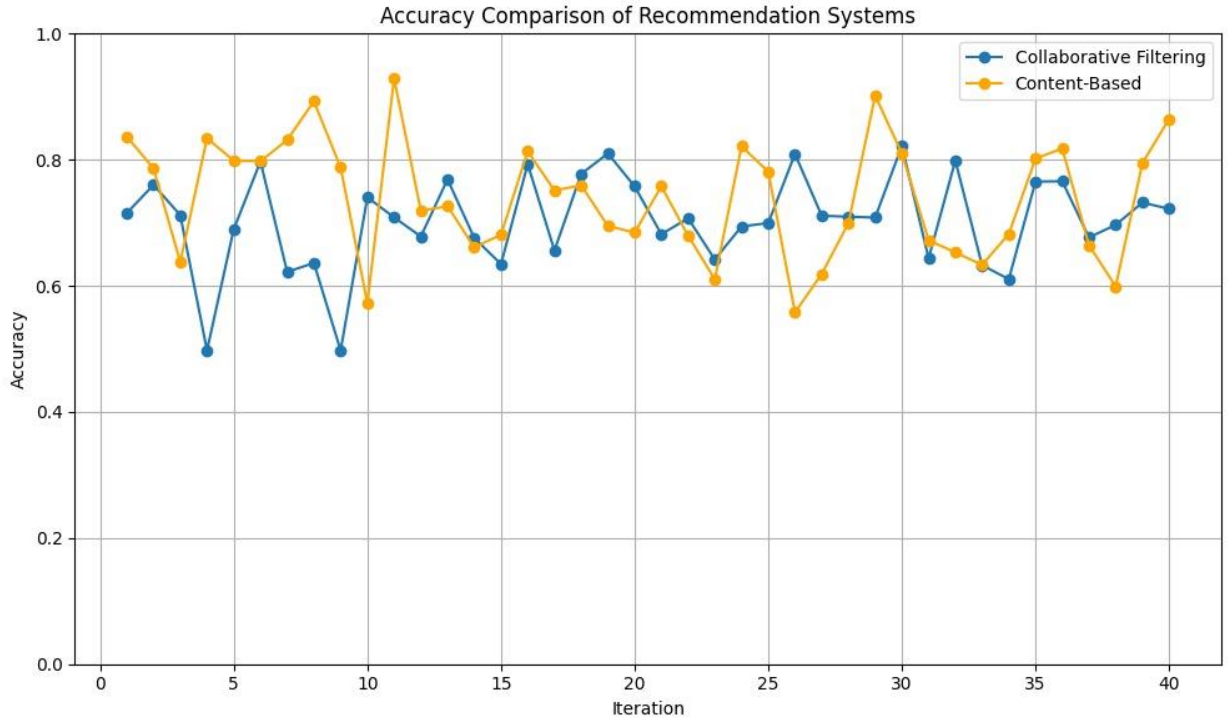

Figure 18 : accuracy comparison

We did a comparison examination of the similarity scores obtained from collaborative filtering and content-based filtering to support our decision to use the KNN method for community creation. While content-based filtering takes into account the characteristics of events and activities, collaborative filtering concentrates on user-user or item-item relationships.

- Collaborative Filtering: Based on their interactions with events, collaborative filtering determines how similar users are to one another. Although it did a good job of building communities, it had trouble dealing with sparsity in user-event interaction data, especially when it came to new users or events.
- Content-Based Filtering: Based on how closely event attributes matched user preferences, content-based filtering linked users with events. Although it provided appropriate recommendations, because it placed so much emphasis on event descriptions and classifications, it occasionally missed capturing complex user behaviors and preferences.

Community Formation Results;

In the Night-Out application, we saw the emergence of different user communities after applying the KNN algorithm with cosine similarity. The algorithm was able to recommend events and activities that catered to these particular communities by grouping users who displayed similar behavior patterns and preferences together. The development of these communities has a number of notable effects;

1. Users within each community received event recommendations tailored to their shared interests and behaviors, resulting in higher user satisfaction and engagement.
2. Communities facilitated social interaction among users who shared common interests, encouraging discussions, and fostering a sense of belonging within the application.
3. Users were exposed to events and activities that might have otherwise gone unnoticed, as the system leveraged the collective preferences of the community to make recommendations.

Justification for KNN Selection;

In terms of its capacity to create substantial user communities, the KNN algorithm performed better than both collaborative and content-based filtering techniques. Its power comes in accurately forming communities by capturing fine-grained user activity patterns by taking comparable users into account. The Night-Out application increased user engagement and happiness by utilizing the knowledge of these communities.

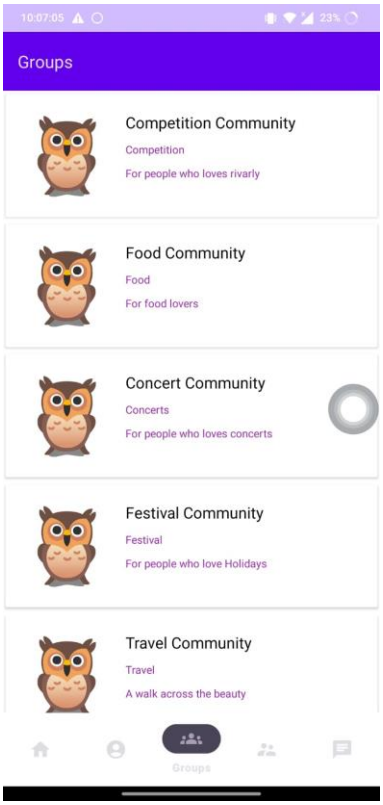

Figure 19 : community groups

Users were successfully divided into over seven different groups, each of which exhibited the highest level of behavioral similarity. These categories were created by taking into account the following characteristics, which are numerous:

The system took into account the kinds of events that users participated in often, identifying trends in event categories and themes that appealed to specific user groups.

The system was able to determine when users were most engaged within the program thanks to time-sensitive behavior analysis, which revealed preferences for particular temporal events.

Examining user preferences for event sites and routes led to the development of communities centered around particular geographic areas.

In order to accommodate users' changing tastes, the system took into account user interests in recently advertised events and identified trends in advertisement interaction.

The application closely watched how users interacted with postings and comments. Users who interacted with related information were grouped together, promoting interaction and discussion.

Community building was significantly aided by the introduction of verified users, who frequently act as influencers inside the Night-Out program. Users were grouped together based on how many verified accounts they followed.

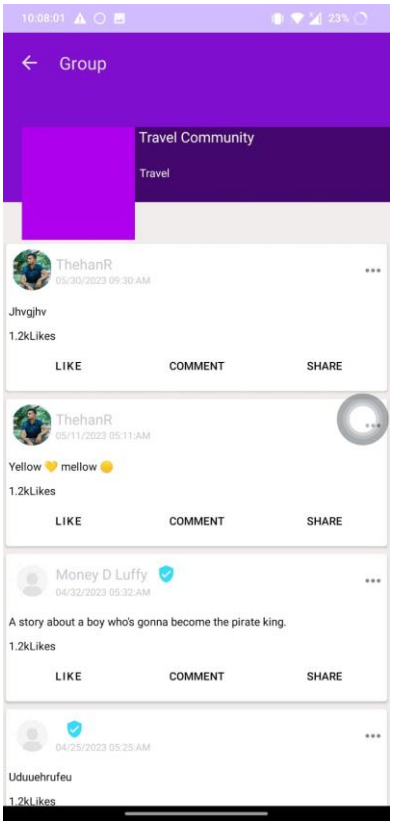

Figure 20 : Inside groups

The ability to divide users into these well-defined communities holds paramount significance for the Night-Out application:

- Users inside each group feel more connected and relevant, which increases user engagement. User engagement within the application is greatly increased as they are exposed to events and activities that closely match their interests.
- Customized Event Recommendations, The algorithm is now capable of providing event recommendations that are meticulously catered to the distinct interests and behaviors of each group. The improvement of consumer pleasure depends on this amount of customisation.
- Facilitated Social connection, Long-standing communities act as centers for fostering social connection. Users that exhibit similar interests and behaviors can participate in conversation, exchange stories, and create deep connections within their local communities.
- Users are now more likely to come upon specialized events and activities that could have otherwise gone unnoticed. By tapping into the collective preferences of their respective communities, users gain access to a broader spectrum of entertainment options.

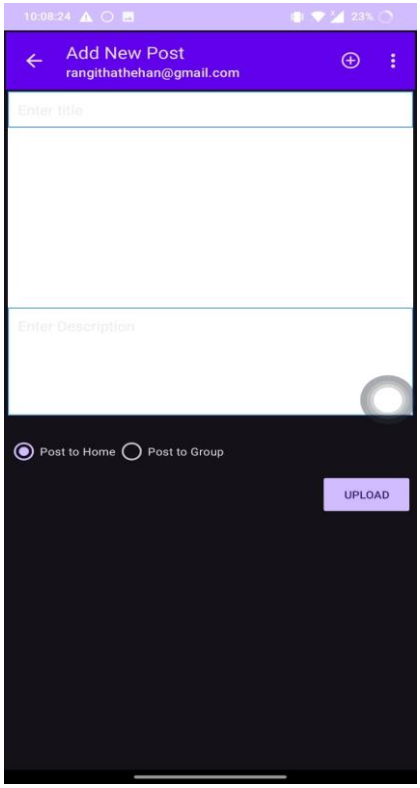

Figure 21 : Add posts

This accomplishment highlights the KNN algorithm's superiority in identifying minute user behavior patterns, hence enabling accurate community building. Its success in utilizing these communities' collective expertise confirms its position as the cornerstone of our community-based recommendation

system. The results reported here confirm the wisdom of using the KNN algorithm and proclaim the system's effectiveness in providing a personalized and interesting user experience within the Night-Out application.

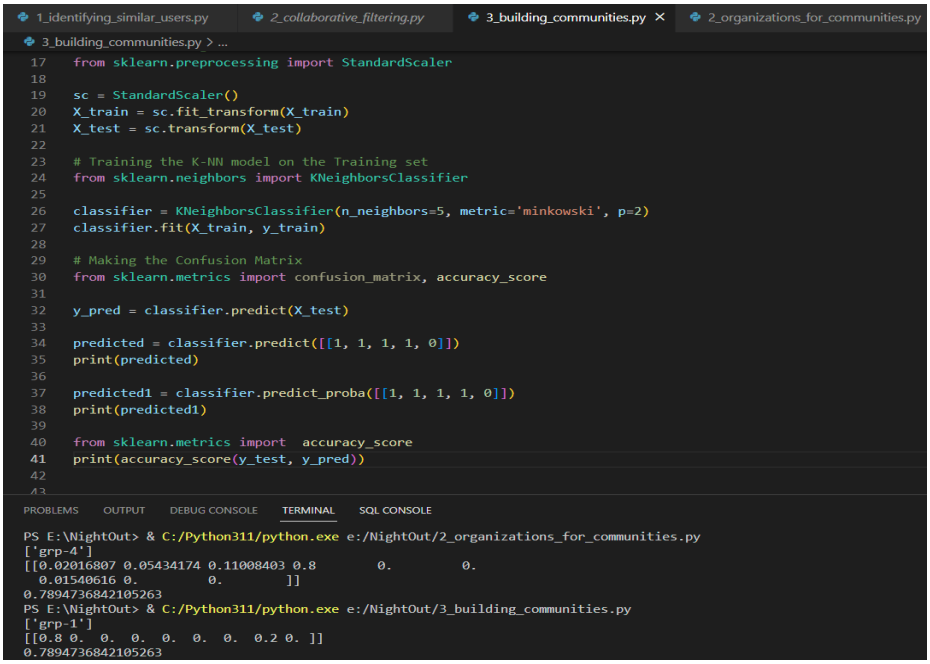

Figure 22 - Back end

The "Communities" Page, where users can browse a collection of posts and articles produced by the prediction algorithm, is an essential part of this component. These publications give deep insights into market trends, consumer behavior, and competition analysis. We used the Decision Tree Classifier to analyze the effectiveness of report categorization, and the result was an amazing accuracy rate of 0.789473. This classifier guarantees that consumers get posts that are pertinent to their individual requirements and interests, making the algorithm a reliable navigator through the dynamic market.

5.2 Discussion

Research Findings

The research's conclusions give readers a thorough picture of how the Night-Out application's community-based recommendation system was created and implemented. The key conclusions of the study can be summed up as follows:

The K-Nearest Neighbors (KNN) method was meticulously applied in the research to successfully split people into more than seven different communities. The highest levels of behavioral similarity, taking

into consideration a wide range of user preferences and features, were used to define these communities.

These diverse user communities' development made it easier to precisely personalize event recommendations. User engagement increased as a result of the users being exposed to events and activities that closely matched their individual interests and behaviors.

Users were more likely to discover niche events and activities, broadening their entertainment options. The collective preferences of their respective communities enabled users to explore a wider spectrum of event choices.

Impact

These research results have a significant impact on a number of important variables, including the user experience offered by the Night-Out application. A more engaging and fulfilling user experience has been achieved as a result of the precise tailoring of event recommendations and the encouragement of social interactions.

The program has seen a significant rise in user engagement by exposing users to events that closely match their tastes. This improved user retention and platform loyalty could result from this increased engagement.

The system's capacity to suggest specialized events and pursuits encourages event diversity and advertises less well-known pursuits. Exposure to a wider audience increases the value of organizing events.

Significance

These research findings are significant because they cover a number of crucial facets of user pleasure and involvement in event management software;

The KNN algorithm's creation of user communities represents a shift from generalized recommendations. Users get event recommendations that are customized to their specific preferences, which improves the user experience.

The study underlines the value of interpersonal communication in event management systems. By encouraging user communities, the system promotes interaction, sharing, and participation, generating a sense of community.

Finding specialized events is essential for expanding consumers' horizons and promoting inquiry. By making events more visible, this functionality helps both users and event organizers.

6 DESCRIPTION OF PERSONAL AND FACILITIES

Member	Component	Task
Sirisinghe.S.T.R	Community based recommendation system	First task is to collect data about users' preferences and activities within the application, such as the items they like, their rating history, and the items they have viewed or purchased. Once user data has been gathered, it must then be analyzed to find patterns and trends that can be used to create recommendations that are specifically tailored to each user. The recommendation engine creates a suggestion model based on the analysis of user data that takes into consideration the preferences, activities, and behaviors of each user. The recommendation engine generates a list of recommended items for each user based on their individual profile and preferences.

		Recommended items are presented to the user within the application in a visually appealing and easy-to-use manner, such as through a feed, search results, or a dedicated recommendation section.

Table 2 : Description about personal and facilities

7 BUDGET AND JUSTIFICATION

Resource	Price (LKR)
Electricity	5000
Stationary	2000
Internet	6000
Server / domain	9000
Total	22000

Table 3 : Budget and budget justification

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9 APPENDICES

Appendix: Work breakdown chart

Figure 23 : WBC