Industrial Internship Report on

”Roommate Bumble”

Prepared by

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Executive Summary
This report provides details of the Industrial Internship provided by upskill Campus and The IoT Academy in collaboration with Industrial Partner UniConverge Technologies Pvt Ltd (UCT). This internship was focused on a project/problem statement provided by UCT. We had to finish the project including the report in 6 weeks’ time. My project is related to real life problem we are facing while shifting to new city for work or for studying. The Problem Statement is the whenever we shifted we are lot’s of problem from that one of the problem is to finding the compatible roommate who’s lifestyle, habits alike to similar to our lifestyle. This internship gave me a very good opportunity to get exposure to Industrial problems and design/implement solution for that. It was an overall great experience to have this internship.

TABLE OF CONTENTS

1 Preface

During my 6-week internship at UniConverge Technologies as a Data Science and Machine Learning (DS & ML) intern, I had the opportunity to gain valuable hands-on experience and insights into the real-world applications of data science and machine learning. Throughout the internship, I was actively involved in various projects and tasks that allowed me to enhance my technical skills and contribute to the company's innovative initiatives.

Week 1-2: Onboarding and Familiarization

During the initial weeks, I familiarized myself with the company's work culture, team dynamics, and ongoing projects. I gained access to relevant tools, software, and datasets. I learned about their ongoing projects and expectations.

Week 3-4: Exploratory Data Analysis (EDA)

In this phase, I worked on a data analysis project where I was tasked with conducting exploratory data analysis on a complex dataset related to customer behavior. I cleaned and preprocessed the data, identified patterns, and visualized key insights using Python libraries like Pandas, NumPy, and Matplotlib. This experience helped me improve my data manipulation and visualization skills.

Week 5-6: Machine Learning Model Development

During the final weeks, I transitioned to developing machine learning models. I collaborated with the team on a predictive maintenance project for a manufacturing client. I worked with historical sensor data to build a predictive model that could forecast equipment failures. I implemented algorithms such as Random Forest and XGBoost, and fine-tuned their hyperparameters. Through this project, I gained hands-on experience in feature engineering, model selection, and performance evaluation.

Key Learnings:

1. Practical Application: This internship provided me with a deep understanding of how data science and machine learning techniques are applied to solve real-world business problems.

2. Collaboration: I learned the importance of effective communication and collaboration within a team. Regular meetings and discussions with colleagues helped me align my work with project goals.

3. Data Preprocessing: I honed my skills in data preprocessing, handling missing values, and dealing with outliers, which are crucial steps in ensuring the quality of data for analysis and modeling.

4. Model Selection and Tuning: Through model development and hyperparameter tuning, I learned how to choose appropriate algorithms for specific tasks and optimize their performance.

5. Time Management: Balancing multiple tasks and meeting deadlines taught me valuable time management skills, ensuring that I could deliver quality work on schedule.

Conclusion:

My 6-week internship at UniConverge Technologies as a Data Science and Machine Learning intern was a transformative experience. It equipped me with practical skills, enhanced my understanding of data-driven decision-making, and exposed me to the challenges and rewards of working on real-world projects. This internship not only expanded my technical capabilities but also gave me a glimpse into the vibrant world of data science in a professional setting.

Need of relevant Internship in career development:-

1. Hands-on Experience:

Internship provide a platform to apply theoretical concepts learned in the classroom to practical situations. This hands-on experience allows individuals to gain insights into the day-to-day tasks and responsibilities of a particular role or industry. It bridges the gap between academic learning and practical application, making the transition to a full-time job smoother.

2. Skill Enhancement:

Internship offer opportunities to acquire and enhance a wide range of skills, including technical skills specific to the industry, soft skills such as communication and teamwork, problem-solving abilities, time management, and adaptability. These skills are highly valued by employers and contribute to an individual's overall career readiness.

3. Industry Exposure:

Internship expose individuals to the industry's norms, practices, and trends. This exposure helps them understand the broader context in which their chosen profession operates and enables them to align their skills and goals with industry demands.

4. Networking Opportunities:

Internship provide access to a professional network of mentors, colleagues, and industry experts. Building relationships during internships can lead to mentorship, references, and even potential job offers in the future. Networking is an essential aspect of career growth, and internships serve as a platform to establish these connections.

5. Resume Building:

Having relevant internships on a resume demonstrates to potential employers that a candidate has practical experience and a genuine interest in the field. Internships showcase one's ability to contribute meaningfully to a team and can set a candidate apart in a competitive job market.

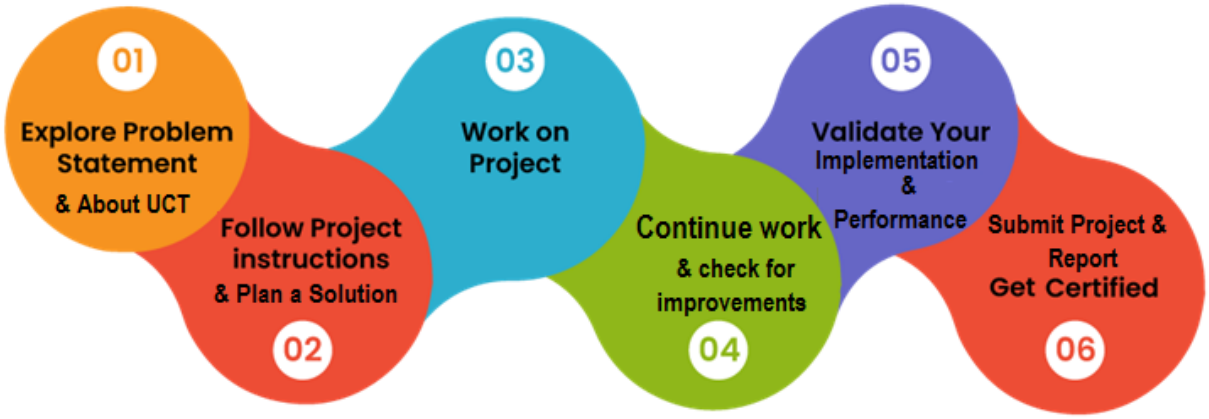
6. Career Clarity:

Internships offer a chance to test the waters and gain insights into different roles, industries, and company cultures. This experience helps individuals make informed decisions about their career paths and areas of specialization.

7. Professional Development:

Internships expose individuals to workplace dynamics, professional etiquette, and expectations. This exposure helps interns develop a strong work ethic, effective communication skills, and a professional demeanor, all of which are vital for a successful career.

How Program was planned



2 Introduction

2.1 About UniConverge Technologies Pvt Ltd

A company established in 2013 and working in Digital Transformation domain and providing Industrial solutions with prime focus on sustainability and RoI.

For developing its products and solutions it is leveraging various **Cutting Edge Technologies e.g. Internet of Things (IoT), Cyber Security, Cloud computing (AWS, Azure), Machine Learning, Communication Technologies (4G/5G/LoRaWAN), Java Full Stack, Python, Front end** etc.

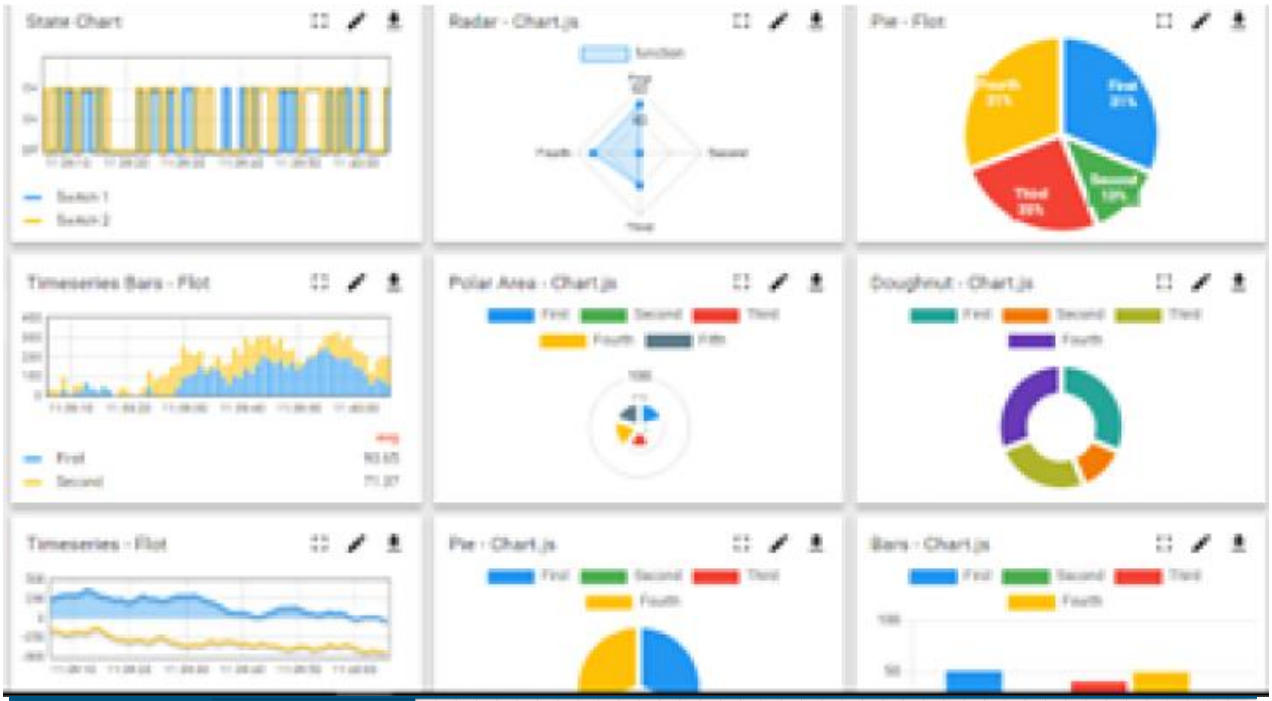
i. UCT IoT Platform (UCT Insight)

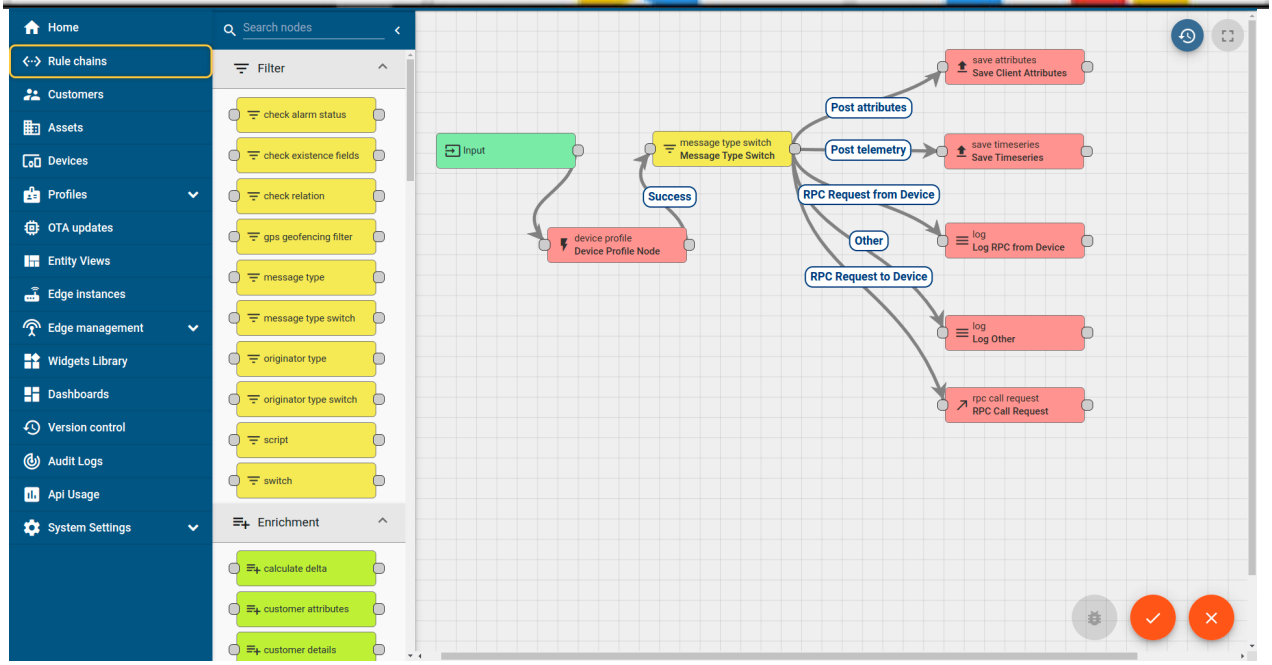
UCT Insight is an IOT platform designed for quick deployment of IOT applications on the same time providing valuable "insight" for your process/business. It has been built in Java for backend and ReactJS for Front end. It has support for MySQL and various NoSql Databases.

- It enables device connectivity via industry standard IoT protocols - MQTT, CoAP, HTTP, Modbus TCP, OPC UA
- It supports both cloud and on-premises deployments.

It has features to

- Build Your own dashboard
- Analytics and Reporting
- Alert and Notification
- Integration with third party application(Power BI, SAP, ERP)
- Rule Engine


State Chart
Radar - Chart.js
Pie - Flot
Timeseries Bars - Flot
Polar Area - Chart.js
Doughnut - Chart.js
Timeseries - Flot
Pie - Chart.js
Bars - Chart.js


Home
Rule chains
Customers
Assets
Devices
Profiles
OTA updates
Entity Views
Edge instances
Edge management
Widgets Library
Dashboards
Version control
Audit Logs
Api Usage
System Settings
Search nodes
Filter
check alarm status
check existence fields
check relation
gps geofencing filter
message type
message type switch
originator type
originator type switch
script
switch
Enrichment
calculate delta
customer attributes
customer details
Input
message type switch
Message Type Switch
Success
device profile
Device Profile Node
Post attributes
Post telemetry
RPC Request from Device
Other
RPC Request to Device
save attributes
Save Client Attributes
save timeseries
Save Timeseries
log
Log RPC from Device
log
Log Other
rpc call request
RPC Call Request

ii. Smart Factory Platform (FACTORY WATCH)

Factory watch is a platform for smart factory needs.

It provides Users/ Factory

- with a scalable solution for their Production and asset monitoring
- OEE and predictive maintenance solution scaling up to digital twin for your assets.
- to unleased the true potential of the data that their machines are generating and helps to identify the KPIs and also improve them.
- A modular architecture that allows users to choose the service that they what to start and then can scale to more complex solutions as per their demands.

Its unique SaaS model helps users to save time, cost and money.

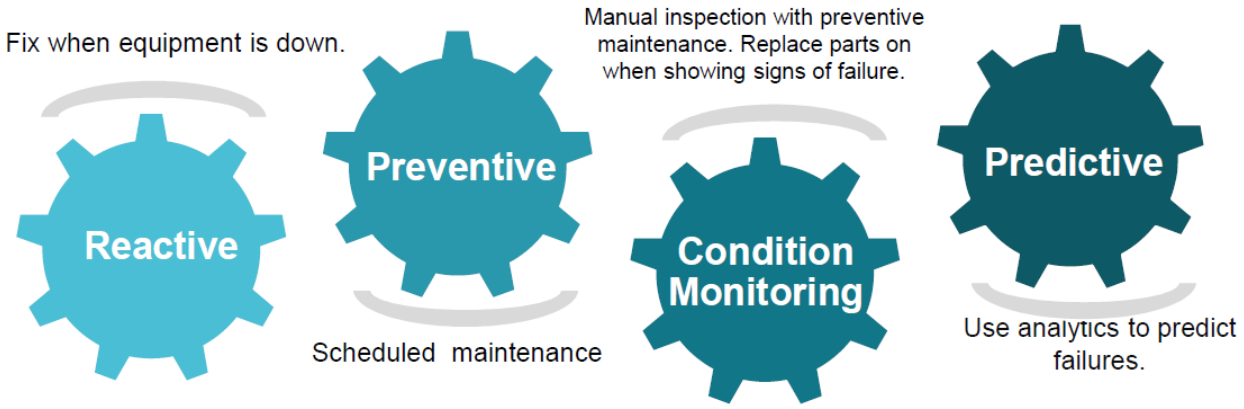
Machine	Operator	Work Order ID	Job ID	Job Performance	Job Progress		Output		Rejection	Time (mins)				Job Status	End Customer
					Start Time	End Time	Planned	Actual		Setup	Pred	Downtime	Idle		
CNC_S7_81	Operator 1	WO0405200001	4168	58%	10:30 AM		55	41	0	80	215	0	45	In Progress	i
CNC_S7_81	Operator 1	WO0405200001	4168	58%	10:30 AM		55	41	0	80	215	0	45	In Progress	i

iii. LoRaWAN based Solution

UCT is one of the early adopters of LoRAWAN technology and providing solution in Agritech, Smart cities, Industrial Monitoring, Smart Street Light, Smart Water/ Gas/ Electricity metering solutions etc.

iv. Predictive Maintenance

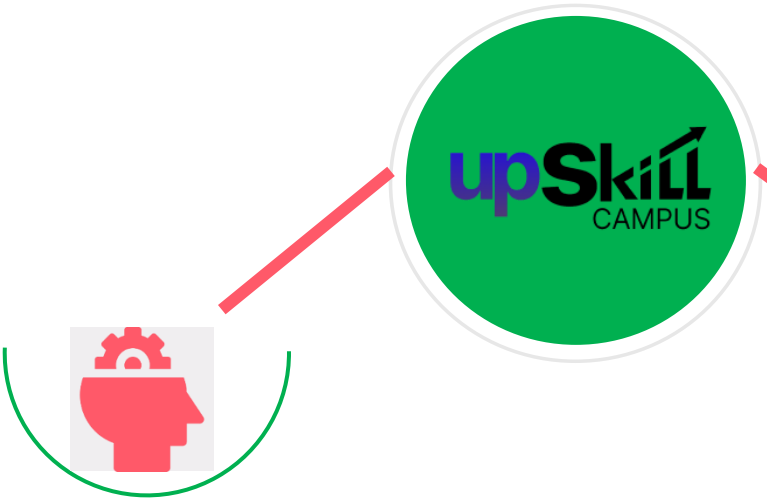
UCT is providing Industrial Machine health monitoring and Predictive maintenance solution leveraging Embedded system, Industrial IoT and Machine Learning Technologies by finding Remaining useful life time of various Machines used in production process.



2.2 About upskill Campus (USC)

upskill Campus along with The IoT Academy and in association with Uniconverge technologies has facilitated the smooth execution of the complete internship process.

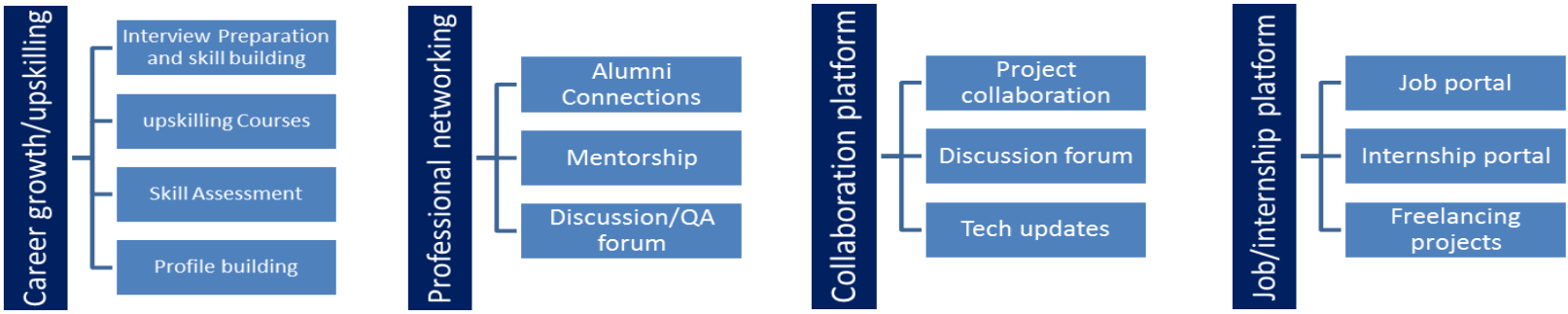
USC is a career development platform that delivers **personalized executive coaching** in a more affordable, scalable and measurable way.



Seeing need of upskilling in self paced manner along-with additional support services e.g. Internship, projects, interaction with Industry experts, Career growth Services

upSkill Campus aiming to upskill 1 million learners in next 5 year

https://www.upskillcampus.com/



2.3 The IoT Academy

The IoT academy is EdTech Division of UCT that is running long executive certification programs in collaboration with EICT Academy, IITK, IITR and IITG in multiple domains.

2.4 Objectives of this Internship program

The objective for this internship program was to

☛ get practical experience of working in the industry.

☛ to solve real world problems.

☛ to have improved job prospects.

☛ to have Improved understanding of our field and its applications.

☛ to have Personal growth like better communication and problem solving.

2.5 Reference

[1] Online Articles:

- "Revolutionizing Roommate Search: The Success Story of Roommate-Finding Apps." HousingTech Insights. URL: https://www.housingtechinsights.com/revolutionizing-roommate-search

- "Navigating Shared Housing with Technology: A Look at Innovative Roommate-Matching Platforms." Urban Living Magazine. URL: https://www.urbanlivingmagazine.com/roommate-matching-platforms

[2] Academic Journals:

- Journal of Housing Studies

- Technology and Society Journal

- Journal of Social Computing

[3] News Websites:

- "New Apps Transform the Way We Find Roommates." TechToday News. URL: https://www.techtodaynews.com/new-apps-roommate-finding

- "Digital Solutions for Finding Compatible Roommates Gain Traction." HouseMatters Weekly. URL: https://www.housemattersweekly.com/digital-solutions-compatible-roommates

2.6 Glossary

Terms	Acronym
DS	**Data Science**
ML	Machine Learning
AI	Artificial Intelligence
DL	Deep Learning

3 Problem Statement

Finding compatible roommates for shared accommodations is often a challenging and time-consuming process. People seeking roommates must rely on limited information, personal networks, and word-of-mouth referrals, which may not necessarily lead to optimal matches. The traditional methods of roommate selection lack a systematic approach to ensure compatibility, resulting in potential conflicts, lifestyle mismatches, and overall dissatisfaction among cohabitants.

Additionally, the lack of a centralized platform that employs technology to facilitate roommate matching further exacerbates the issue. Individuals looking for roommates often have varying preferences, habits, and lifestyles that need to be considered for a harmonious living arrangement. There is a need for a more efficient, data-driven, and user-friendly solution that streamlines the process of finding compatible roommates, enhancing the overall roommate selection experience.

- Difficulty in finding compatible roommates.
- Lifestyle and preference discrepancies.
- Potential conflicts and disrupted living environments.
- Time-consuming and inefficient roommate search process.
- Safety and security concerns.
- Lack of tailored roommate matching solutions.

4 Existing and Proposed solution

Existing Solution:

The existing solution for roommate search typically involves manual methods, word-of-mouth referrals, and postings on social media or classified ads platforms. Individuals seeking roommates rely on their personal networks, university communities, or local housing groups to find potential cohabitants. However, this process lacks a standardized approach to ensure compatibility and may lead to mismatches in lifestyle preferences, habits, and expectations.

Existing solutions often lack a centralized platform that combines technology, data analysis, and user preferences to facilitate effective roommate matching. This results in a time-consuming and potentially frustrating process for individuals seeking roommates.

Proposed Solution:-

"Roommate Bumble" proposes a comprehensive solution to address the limitations of the existing roommate search process. This platform leverages data science, machine learning, and user input to offer an innovative approach to roommate matching. The key components of the proposed solution are as follows:

1. User Profiles and Preferences: Users of "Roommate Bumble" create detailed profiles that include information about their lifestyle, habits, preferences, work schedules, cleanliness standards, hobbies, and more. This information forms the basis for effective roommate matching.

2. Algorithmic Matching: The platform employs advanced algorithms that analyze user profiles and preferences to identify potential matches. These algorithms take into consideration compatibility factors such as sleep patterns, social preferences, and daily routines.

3. Personalized Recommendations: Users receive personalized roommate recommendations based on algorithmic analysis and shared preferences. The platform presents users with a curated list of potential roommates who align with their lifestyle choices.

4. Communication and Interaction: "Roommate Bumble" offers communication features that allow users to connect with potential roommates through secure messaging. This facilitates initial discussions, mutual understanding, and the exchange of important information.

5. Privacy and Security:The platform prioritizes user privacy and security, ensuring that personal information is kept confidential and interactions occur within a safe digital environment.

Here's a Basic methodology of how to build a machine learning model to recommend roommates based on similarities :

- A recommendation system using Hamming & Euclidean distance is a content-based filtering approach that suggests items to users based on their previous preferences or history. difference between two binary strings of equal length, and it can be used to compute the similarity between items or users.
- Collect data: Collect data on user preferences or history, and item attributes or features. For example, for a music recommendation system, user preferences could be song ratings, and item features could be the genre, artist, and release year of the song.
- Vectorize data: Convert the data into binary vectors, where each feature or preference corresponds to a binary digit in the vector. For example, a user who rated five songs with binary ratings of 0 or 1, could be represented by a binary vector of length 5.
- Hamming & Euclidean distance: Compute the Hamming distance & Euclidean distance between each pair of items or users.
- Recommend items: Recommend items that are similar to the items the user has liked or rated highly

4.1 Code submission (Github link):-

https://github.com/gauri1502/upskillcampus/blob/main/RoommateBumble.ipynb

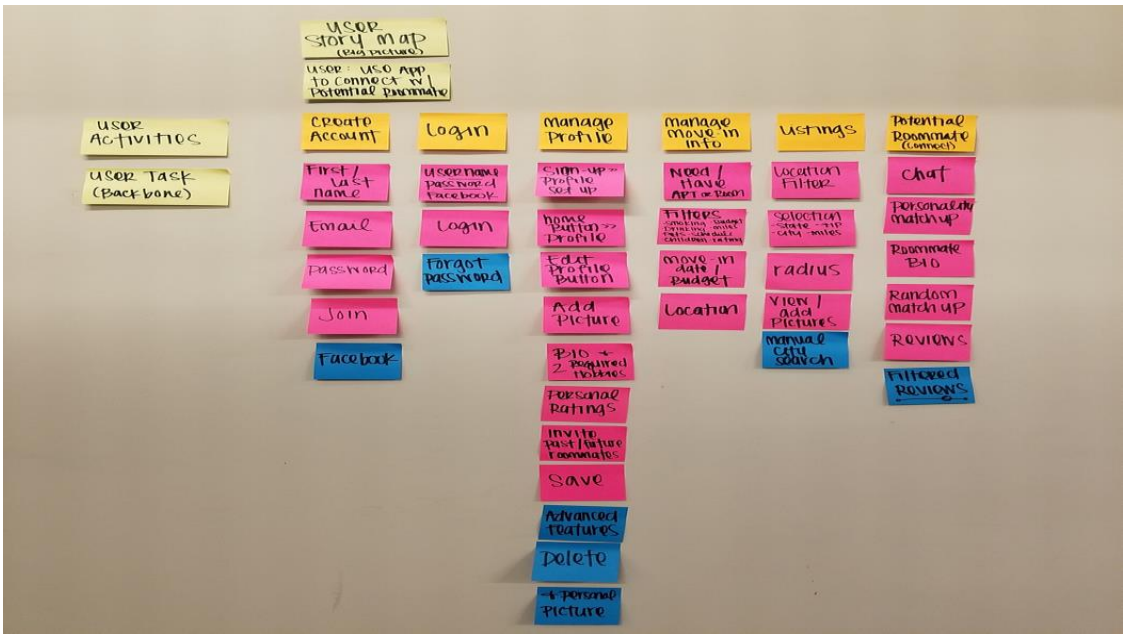
4.2 Report submission (Github link) :

https://github.com/gauri1502/Roommate_bumble/blob/main/RoommateBumble_Gauri_USC_UCT.pdf

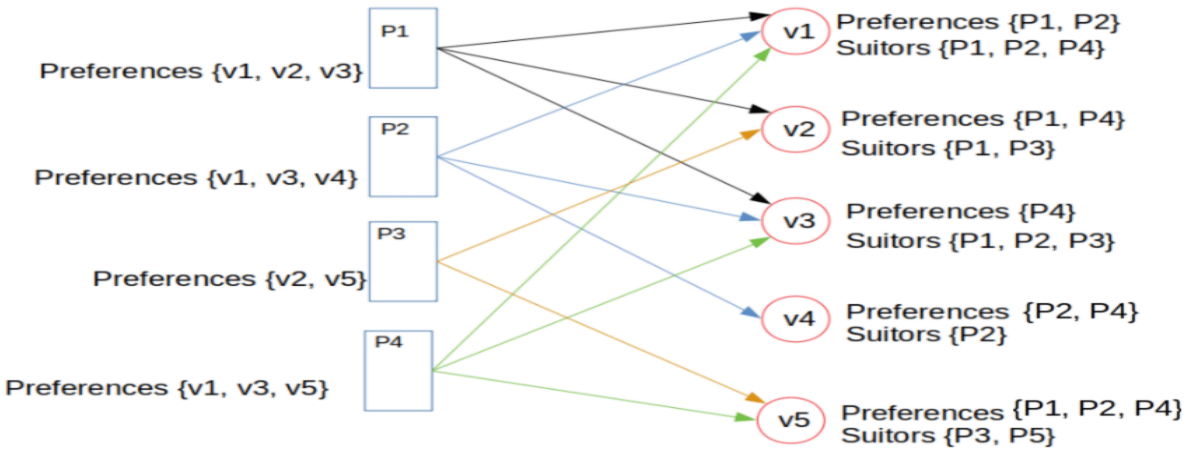
5 Proposed Design/ Model

Given more details about design flow of your solution. This is applicable for all domains. DS/ML Students can cover it after they have their algorithm implementation. There is always a start, intermediate stages and then final outcome.

5.1 High Level Diagram



5.2 Low Level Diagram



6 Performance Test

Conducting a performance test for "Roommate Bumble" involves evaluating the platform's responsiveness, scalability, and efficiency under various conditions. Here's how you could approach a performance test for the roommate matching platform:

1. Test Objectives:
Define the specific objectives of the performance test, such as measuring system responsiveness, assessing scalability, and identifying potential bottlenecks.

2. Test Scenarios:
Create realistic test scenarios that mimic the actual usage patterns of the platform. For example:

- Simulate different user loads (e.g., low, medium, high) to observe how the system handles varying levels of traffic.

- Test scenarios that involve simultaneous user interactions, such as profile creation, browsing matches, and initiating conversations.

3. Responsiveness Test:

Measure the system's responsiveness by tracking response times for common user actions, such as:

- Loading user profiles and preferences.

- Displaying match recommendations.

- Initiating and sending messages.

4. Scalability Test:
Assess the system's scalability by gradually increasing the user load to determine how it handles increased demand. Measure:

- Response times and server load as the number of concurrent users increases.

- Resource utilization (CPU, memory, network) under different load levels.

5. Concurrent User Test:
Simulate scenarios where a high number of users interact simultaneously. This test helps identify potential bottlenecks and performance degradation when many users are using the platform at once.

6. Stress Test:
Subject the system to extreme conditions to understand its breaking point and identify potential failure points. This could involve creating a sudden spike in user load or generating excessive messaging activity.

6.1 Test Plan/ Test Cases

1. User Profile Creation:
- Test Case: Verify that users can successfully create profiles with accurate information.

2. Matching Algorithm Accuracy:

- Test Case: Check if the matching algorithm produces accurate roommate recommendations.

3. Personalized Recommendations:
- Test Case: Confirm that the platform generates personalized roommate recommendations.

4. Messaging Interaction:
- Test Case: Ensure that users can initiate conversations with potential roommates.

5. Data Privacy:
- Test Case: Verify that user data and messages are kept private and secure.

6. User Feedback:
- Test Case: Confirm that users can provide feedback on roommate matches.

7. Error Handling:
- Test Case: Check how the platform handles errors and invalid inputs.

8. Cross-Browser Compatibility:
- Test Case: Verify that the platform works correctly across different web browsers.

6.2 Test Procedure

- Steps for Creating User Profile:

1. Navigate to the profile creation page.

2. Fill in valid information for all required fields.

3. Submit the profile creation form.

- Steps for Matching Algorithm:

1. Create profiles for multiple users with different preferences and habits.

2. Initiate the matching process.

- Steps for Personal Recommendation:

1. Log in as a user with specific preferences.

2. View the list of recommended roommates.

6.3 Performance Outcome

- The user's profile is successfully created and saved in the database.
- The algorithm provides roommate recommendations that align with the preferences of the users.
- The recommended roommates reflect the user's preferences and habits.
- The messaging interface opens, allowing users to communicate with each other securely.
- Messages are only accessible to the users involved in the conversation.
- The platform displays appropriate error messages and prevents incomplete submissions.
- The platform functions consistently and without major issues across supported browsers.

7 My learnings

Certainly, I can provide a summary of my overall learning and how it would contribute to my career growth, drawing insights from the "Roommate Bumble" project and the Data Science and Machine Learning internship with UniConverge Technologies.

Summary of Learning:
Through the "Roommate Bumble" project and the Data Science and Machine Learning internship, I gained valuable insights and experiences that have contributed significantly to my skill set and understanding of real-world applications of technology:

1. Technical Skills: I developed a strong foundation in data science, machine learning, and application development by working on the "Roommate Bumble" project. This allowed me to understand the end-to-end process of creating a tech product, from concept to implementation.
2. Algorithms and Data Analysis: During the project, I learned to design and implement algorithms for user matching and segmentation. I gained proficiency in analyzing data patterns, optimizing algorithms, and evaluating model performance.
3. Collaboration and Communication: Working on a project like "Roommate Bumble" involved collaborating with team members, understanding client needs, and communicating technical concepts effectively to non-technical stakeholders.
4. Problem Solving: I encountered various challenges during the project, such as data preprocessing, algorithm design, and user interface development. These challenges taught me to approach problems systematically and find innovative solutions.
5. Project Management: Managing the development lifecycle of "Roommate Bumble" exposed me to project planning, prioritization, and iterative development. I learned the importance of setting milestones and meeting deadlines.

Career Growth:
The skills and experiences gained from both the "Roommate Bumble" project and the internship with UniConverge Technologies have profound implications for my career growth:
1. Strong Foundation: The hands-on experience with data science, machine learning, and application development provides a solid foundation for a career in technology and data-driven decision-making.
2. Adaptability: The ability to work on a diverse project like "Roommate Bumble" showcases my adaptability and readiness to take on new challenges in a dynamic work environment.
3. Problem-Solving Skills: The challenges faced during the project sharpened my problem-solving skills, which are crucial for addressing complex technical issues and delivering innovative solutions.
4. Interdisciplinary Experience: The combination of technical skills, communication abilities, and project management exposure equips me to work effectively across teams, bridging the gap between technical and non-technical stakeholders.

5. Industry Relevance: As industries increasingly rely on data-driven insights and technology solutions, my experience with real-world projects and industry-oriented internships positions me well for career opportunities in the tech and data science domains.
6. Continuous Learning: The internship and project highlighted the importance of continuous learning and staying updated with the latest industry trends, which is essential for professional growth in rapidly evolving fields.

In essence, the "Roommate Bumble" project and the UniConverge Technologies internship have been transformative in terms of my skill development, problem-solving abilities, and adaptability. They provide a strong foundation for my future endeavors and career growth in the technology and data science sectors.

8 Future work scope

- The future scope of machine learning recommendation models that recommend compatible roommates is quite promising. With the growing popularity of roommate finder apps and websites, there is an increasing demand for personalized roommate recommendations that take into account a wide range of factors, including personality traits, lifestyle preferences, and social interests.
- In future we will try to add more attributes like which era of music you like, you like travelling or not, love to watch movies/web series or not and social media interest. By adding these features one can get more suitable roommates.
- And we can also provide features like Trial period, reporting system etc.
- Our next goal is to deploy this model on android application.
- The future of machine learning recommendation models that recommend compatible roommates looks promising, as these models have the potential to revolutionize the roommate matching process, making it easier and more efficient for users to find compatible roommates who share similar interests and lifestyles.