Roommate Allocation System with AI Integration

Saharsh Kumbhar[1], Mrunal Rasal[2], Snehal Kurle[3] and Ayush Kasulkar[4], S. P. Gunjal[5]

[1,2,3,4] *UG Students, Information Technology, SKN Sinhgad Institute of Technology and Science, India*
[5]*Guid UG Students, Information Technology, SKN Sinhgad Institute of Technology and Science, India*

Abstract - This paper presents the "Roommate Allocation System with AI Integration," designed to enhance roommate matching for students and young professionals. Utilizing AI to analyze user preferences and compatibility factors, the system offers personalized recommendations, addressing limitations of traditional methods. The research demonstrates that AI significantly improves the efficiency and accuracy of roommate allocation, fostering a more harmonious living environment.

I. INTRODUCTION

Finding suitable roommates is a critical aspect of shared housing, especially for students and young professionals in new cities. Traditional methods for locating roommates—such as online listings, social media groups, or word-of-mouth—are often inefficient and unreliable, lacking personalized matching features and raising safety concerns. These traditional approaches also fail to address individual compatibility factors, such as lifestyle preferences, schedules, or personality traits, which are crucial for fostering harmonious shared living arrangements.

To address these challenges, this research explores a "Roommate Allocation System with AI Integration." This AI-driven platform is designed to simplify and enhance the roommate search process by analyzing user data to generate compatibility-based matches. By leveraging artificial intelligence, the system can recommend suitable roommates based on various compatibility metrics, such as cleanliness, social habits, and sleeping patterns, reducing the likelihood of conflicts and improving the overall living experience.

Research Objectives: This study aims to examine the effectiveness of an AI-integrated roommate allocation system in matching compatible roommates. The objectives include analyzing user satisfaction, evaluating the system's accuracy in compatibility matching, and comparing its performance with traditional roommate-finding methods. Ultimately, this research seeks to demonstrate how AI can revolutionize shared housing by making roommate selection a smarter, safer, and more efficient process.

II. AIM AND OBJECTIVES

Aim:

The aim of this study is to develop and evaluate an AI-driven roommate allocation system that optimally matches individuals based on compatibility factors, improving the experience of shared living for students and young professionals.

Objectives:

1. To analyze the limitations of traditional roommate-finding methods and identify key areas where AI can enhance the matching process.
2. To design an AI-integrated system that utilizes user data (preferences, lifestyle habits, personality traits) to generate compatibility-based roommate recommendations.
3. To evaluate the effectiveness of the AI system in terms of match accuracy and user satisfaction, focusing on compatibility and reduced roommate conflicts.
4. To compare the AI-driven system with existing methods in terms of efficiency, ease of use, and overall user experience.
5. To assess the system's scalability and privacy measures, ensuring it meets the data security and user protection needs associated with shared living. These objectives seek to validate the potential of AI to transform the roommate selection process, addressing challenges and optimizing shared housing arrangements.

III. TECHNIQUE USED

User-Friendly Interface: Prioritize a clean, intuitive, and mobile-responsive design. This ensures a smooth experience for students searching for flats on various devices (phones, laptops, tablets).

Targeted Search: Implement robust search filters allowing students to refine their flat hunt by location, price range, amenities (laundry, gym, etc.), number of bedrooms/bathrooms, and even pet-friendliness.

Detailed Listings: Encourage landlords/property managers to create comprehensive listings with highquality photos, virtual tours (optional), detailed descriptions, and clear information on rent, utilities, and lease terms.

Roommate Matching: Develop a matching algorithm that considers factors like personality traits, study habits, living preferences, and potentially even interests (through surveys) to connect compatible roommates.

AI and ML Techniques: Discuss specific algorithms used for matching roommates. Provide a rationale for choosing particular techniques, like clustering for grouping similar profiles or collaborative filtering for personalized recommendations.

Data Processing Techniques: Describe preprocessing steps, such as data cleaning, normalization, or encoding. Mention any feature extraction or dimensionality reduction techniques if applicable.

Database Management: Create a robust database to store information on available flats, student profiles (including search preferences), and potentially landlord/property manager details.

Mapping Integration: Utilize mapping APIs to display flats visually on a map, allowing students to easily see flat locations relative to their university or desired areas.

Secure User Authentication: Implement secure login and registration processes with features like two-factor authentication to protect user data.

Additional Considerations:

Content Management System (CMS): Consider using a CMS to allow landlords and students to easily update their listings and profiles on the platform.

Payment Gateway (Optional): If Flatmate plans to charge fees for certain services, integrating a secure payment gateway would be necessary.

Community Features (Optional): Explore options for fostering a sense of community, such as forums where students can connect or share recommendations about neighborhoods/amenities.

IV. RESEARCH METHODOLOGY

Population and Sample: Define the characteristics of your population and the sampling method (e.g., random sampling from a university, online survey participants).

Data and Sources of Data: Explain the process of data collection. Describe the survey questions and what types of data (qualitative and quantitative) will be analyzed.

Theoretical Framework: Reiterate the theories applied to establish compatibility criteria in your system, like social compatibility, psychometrics, or behavioral modeling frameworks. Statistical Tools and Econometric Models: Describe the tools (like SPSS, R, or Python libraries) and statistical techniques that will be used to analyze the data. Outline econometric models or machine learning algorithms, such as clustering (e.g., kmeans), classification (e.g., decision trees), or recommendation models (e.g., collaborative filtering)

V. LITERATURE SURVEY

AI-driven recommendation systems, widely used in retail and media, have shown potential for roommate matching by offering personalized, data-driven compatibility solutions. Traditional roommate-finding methods often result in mismatches due to limited personalization, whereas AI can assess critical compatibility metrics such as cleanliness, social habits, and sleeping patterns (Aggarwal, 2016; Nguyen et al., 2013).

Research highlights key challenges in roommate matching, including privacy concerns around sensitive personal data, stressing the importance of secure, compliant data handling to build user trust (Montjoye et al., 2013; Voigt & Bussche, 2017). Studies show that AI significantly improves roommate compatibility, leading to higher satisfaction and fewer conflicts compared to traditional methods (Kim & LaRose, 2004).

This survey supports the use of AI in roommate allocation systems to bridge existing gaps, improve user experience, and meet modern privacy standards.

VI. CONCLUSION

The development of a "Roommate Allocation System with AI Integration" represents a significant advancement in addressing the challenges faced by individuals seeking compatible roommates, particularly in student and shared housing environments. By leveraging artificial intelligence, this system provides a data-driven approach to

matching potential roommates based on compatibility factors such as lifestyle preferences, personality traits, and individual habits.

Through this research, it has been demonstrated that traditional methods of roommate finding are often inadequate, leading to mismatches that can result in conflicts and dissatisfaction. The AI-driven system not only enhances the accuracy of roommate recommendations but also streamlines the search process, making it more efficient and user-friendly.

Furthermore, the emphasis on user privacy and data security within the system ensures that participants can engage with confidence, fostering a safe environment for users to find their ideal living arrangements.

Ultimately, the implementation of an AI-integrated roommate allocation system holds the potential to revolutionize the way individuals approach shared living, paving the way for more harmonious cohabitation experiences and enhancing the overall quality of life for students and young professionals alike. This research not only highlights the capabilities of AI in personalizing the roommate search but also sets the groundwork for future innovations in smart living solutions.

VII. ACKNOWLEDGMENT

I would like to express my sincere gratitude to everyone who contributed to the "Roommate Allocation System with AI Integration" project.

I extend my heartfelt thanks to my advisor, for their invaluable guidance and support throughout this research. Their expertise was instrumental in shaping this project.

Also appreciate my peers and colleagues, particularly, for their feedback and collaboration during various stages of the project. Special thanks to the participants for sharing their preferences and feedback, which were crucial for understanding user needs.

Finally, I am grateful to [SKN Sinhgad Institute of Technology and Science] for providing the resources necessary to conduct this research. This project would not have been possible without the contributions and encouragement of these individuals and organizations. Thank you all for your support!

VIII. REFERENCES

WEB REFERENCES:

[1] Mintel. (2022). "Online Property Rental Platforms - UK - January 2022." [Online]. Available: https://store.mintel.com/ukonlineproperty-rental-platforms-market-report. [Accessed: March 30, 2024].

[2] NoBroker
Get Verified Tenants for your Property on NoBroker
https://www.google.com/search?q=nobroker&rlz=1C1CHZN_enIN993IN993&oq=nobroker&gs_lcrp=EgZjaHJvbWUyBggAEEUYODdIBCTM3NDJqMGoxNagCCLACAQ&sourceid=chrome&ie=UTF-8

[3] Housing.com https://www.housing.com
Looking to Buy Property in Mumbai. Maximum Verified Listings. Filter by locality, budget and type. Real Property photos, Explore Neighborhood. Easy Home Loans. Price History & Trends. Amenities Search. Real & Verified Photos.

[4] FlatMate.in https://www.flatmate.in/
Your all-in-one solution for discovering the finest spaces and compatible roomies. With 1000+ listings, FlatMate is engineered to simplify your quest.

Other REFERENCES:

1. Halle, P. and Shiyamala, S. (2019) "Architectural Integration for Wireless Communication Security in terms of integrity for Advanced Metering Infrastructure-Survey Paper", Asian Journal For Convergence In Technology (AJCT) ISSN -2350-1146. Available at:
https://asianssr.org/index.php/ajct/article/view/771

2. Halle, P. and Shiyamala, S. (2019) "Secure Routing through Refining Reliability for WSN against DoS Attacks using AODSD2V2 Algorithm for AMI," International Journal of Innovative Technology and Exploring Engineering. Blue Eyes Intelligence Engineering and Sciences Engineering and Sciences Publication - BEIESP.
https://doi.org/10.35940/ijitee.I8178.0881019
(Scopus)

3. Halle, P.D., Shiyamala, S.and Rohokale, Dr.V.M. (2020) "Secure Directionfinding Protocols and QoS for WSN for Diverse Applications-A Review," International Journal of Future Generation Communication and Networking, Vol. 13 No. 3 (2020) Available at:
https://sersc.org/journals/index.php/IJFGCN/article/view/26983. (Web of Science)