Roomie Roulette

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Abstract

Finding a compatible roommate can be a challenging task, particularly in unfamiliar locations. This paper presents a novel solution to this problem through the development of an engaging and interactive game that utilizes AI to provide players with a set of Non-Player Characters (NPCs) representing a diverse range of personalities and traits. The game involves a customized questionnaire for each NPC, with the player's responses used to calculate a compatibility score. The highest compatibility score will indicate the most suitable roommate for the player. The project utilizes Ren'Py as the frontend and CIF as the backend technology for data management and storage, with a Node server and CiF action rules used to increase the compatibility score. The project's results demonstrate that the use of AI and game-based approaches for finding compatible roommates can provide a more engaging and personalized experience for users, resulting in increased user satisfaction and potentially better roommate matches. Additionally, the integration of CIF and Node server technologies allowed for efficient data management and improved compatibility scoring accuracy. Further research could explore the potential for this approach to be scaled up and applied to other areas of social matching, such as dating or friendship building.

Keywords: Social AI, Interactive Storytelling, Visual Novel, CiF, Ren'Py, Node.js

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1 Introduction

As the world becomes increasingly interconnected, people are more frequently finding themselves in unfamiliar locations with the need to find compatible roommates. This task can be daunting, especially when the process is rushed, and the available information is limited. However, advancements in Artificial Intelligence (AI) and interactive games have created new possibilities for facilitating the decision-making process when choosing a roommate.

Our project aims to explore the effectiveness of using AI and interactive games to help individuals make informed decisions when selecting a roommate. The game we have developed presents the player with a set of three Non-Player Characters (NPCs) with distinct personalities and traits, and the player's goal is to select the most compatible roommate from among them. The project is motivated by the personal experiences of international students who face the challenge of finding suitable roommates when relocating to unfamiliar locations for their studies. We believe that this project has the potential to not only provide an engaging and enjoyable gaming experience but also have real-world applications to help individuals in similar situations.

To achieve our research objectives, we have formulated the following research questions:

RQ1: How effective is the use of AI and interactive games in facilitating decision-making processes such as roommate selection? RQ2: Can the use of customized questionnaires and situational-based questions lead to more accurate roommate compatibility scores? RQ3: How does the use of Ren'Py and CIF technologies impact the development and implementation of interactive games? RQ4: How does the use of visual and audio elements such as animations and music impact the overall user experience and decision-making process in interactive games?

We will address these research questions by leveraging the CIF AI engine for data management and storage, Ren'Py as a visual novel engine for frontend development, and an express server as the backend. The integration of these technologies has allowed us to create an engaging and interactive user experience that is both enjoyable and informative. In the following sections, we will discuss the implementation of the project, including the CIF module, Ren'Py module, and express server. We will then evaluate the effectiveness of the project based on the compatibility scores of the NPCs

and compare them to the actual values. Additionally, we will discuss the limitations of the project, related works, and future directions for research.

Overall, our project aims to provide insights into the use of AI and interactive games to facilitate decision-making processes, specifically in the context of roommate selection. We believe that our findings will contribute to the development of future decision-making tools that leverage the power of AI and interactive games to support individuals and organizations in various domains.

2 Story

The game Roomie Roulette puts you in the shoes of a college student who has just move to Davis from India and is on a hunt for a roommate and a home. There are three players on the look for roomates namely Rahul, John, Anya. The game starts with a brief introduction of the player and takes player name as input. Following the story are the three NPC introduction with their backstory and why they are looking for a roommate. According to the backstory John got of the wrong foot with the player because he was rude to the player on the first day of college. Anya also from the same high school and country as the player and was a childhood crush of the player. The default compatibility score of the three characters are adjusted according to the this history. The player is then provided with the choice of selection of the NPC he wants to interview with. The story then moves to the living room of the selected NPC which has their background music playing. The NPC gives a short room tour in the form of video. The NPC introduces themselves further and and address their history with player. The NPC then asks a set of 6-7 questions for the user in the form of a menu with options in RenPy. The player is to select option that best suits them. The Cif compatibility scores are updated according to the option chosen by user. This goes on for the rest two NPC's . A final score is then calculated for all the 3 characters that is retrieved from the CiF server. The story then has a dramatic drumroll and the winner is announced depending upon the score. The game suggests the appropriate roommate as their compatibility with you is the highest

3 Implementation

3.1 Ren'Py

Ren'Py is a visual novel engine that has been utilized to develop an engaging and interactive user experience for the Roomie Roulette game project. Ren'Py is a Python-based engine that enables the creation of both visual novels and life simulation games. It includes the ability to create branching stories, save file systems, rollback to previous points in the story, a variety of scene transitions, DLC, and more.Ren'Py's integration with CIF through Python blocks ensures that the frontend and backend of the game work together seamlessly.

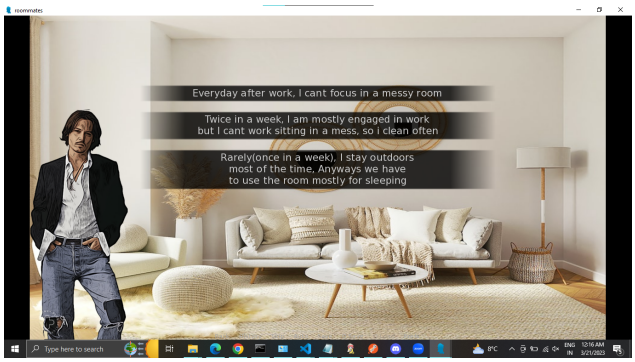

Figure 1. Each NPC has a customized questionnaire

This integration enables the use of customized questionnaires for each NPC with multiple options, including both radio button inputs and text-based input from the user, which affects the compatibility score.Ren'Py's ability to incorporate various media types, such as audio, video, and animation, has been leveraged to enhance the overall user experience. The use of animations and background images helps to create an immersive environment, while the integration of music adds an emotional dimension to the game.

Moreover, Ren'Py has also been utilized to create unique backstories for each NPC, which adds a layer of depth and complexity to the game. For instance, John was rude to the player in the past, Anya is a childhood crush of the player, and Rahul has a bad history, which affects their compatibility score. This backstory information is used to adjust the default compatibility score for each NPC, which is mentioned in the history.js file of the CIF AI engine.

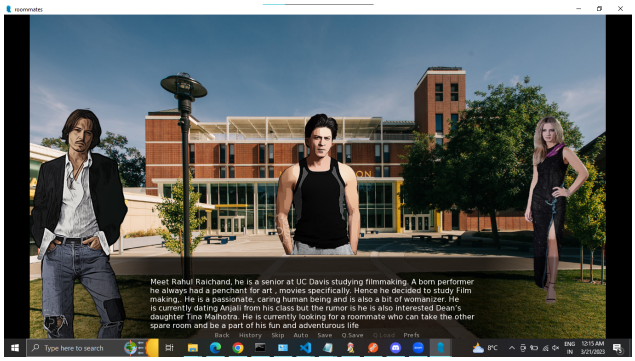

Figure 2. Each NPC with a unique backstory is introduced

Ren'Py's user interface capabilities have been used to create customized questionnaires for each NPC, which include both radio button inputs and text-based input from the user. The player's responses are used to calculate a compatibility score with each NPC, which is displayed to the player at the end of the game.

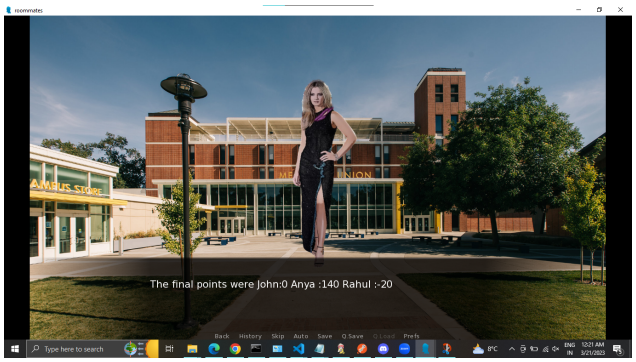

Figure 3. The NPC with the highest compatibility score wins!

The integration of Ren'Py into the Roomie Roulette game project has provided an immersive and engaging user experience, enabling players to find their most compatible roommate among the three NPCs. Ren'Py's features and capabilities have been utilized to create a visually appealing and interactive game that draws inspiration from real-life challenges of finding suitable roommates, particularly in unfamiliar locations when relocating.

3.2 Backend Server

A Node.js-based backend server built for the REST API is responsible for connecting the AI system and the frontend. It handles various types of requests from the visual novel frontend, including actions, attribute values, and more. The server retrieves the requested data, converts it into the appropriate CiF function calls, and sends back the results. Additionally, the server can access the social database maintained by CiF. This server can be extended to more games and social schemas to carry out the functionalities of Cif on a backend server, thus enabling CiF to communicate with a REST server.

3.3 Cif

Cif (Comme il Faut) is an AI system that manages social exchanges between the characters in our game. It maintains the social states of different classes of attributes in a social frame database. The decisions that are made by the player are defined in the volitions which match actions that can be executed based on the volitions. Matched actions are returned in a sorted order to choose the most probable actions which are calculated by specifying the weights of the volition rules. In our project, we are specifying the criterions needed to be satisfied by the player to be compatible as a roommate with one of the NPC's.

3.3.1 Actions

. Roommate compatibility is calculated based on three criterions:

- Hygiene of Player as perceived by an NPC.
- Similar preferences of Player to an NPC.
- Intellect of the player as perceived by an NPC.

Actions are defined to alter these attributes of the player and volition rules are used to decide which action has to be executed based on the response selected by the player.

3.3.2 Volition rules

. These rules are defined to determine how important hygiene, preference and intellect is to each NPC. These rules match the Intent of the start actions to determine which path to take in order to reach a terminal action and then execute the most probable actions. Social states between the cast are changed in this way.

3.3.3 Schema

. Contains social states of the characters in our game. In our project we have 2 classes of social states:

- Attributes: Hygiene, Preference and Intellect.
- Choose: ChooseJohn,ChooseRahul,ChooseShubh.

Here, attributes define the social states we keep track of to compute compatibility of the player with an NPC and 'Choose' class has states to determine which NPC is picked at the end as the most compatible.

4 Evaluation

Evaluation Metrics: The evaluation of Roomie Roulette gaming interface is done on the basis of two main metrics. First, the diversity and accuracy of results. obtained within multiple runs. Second, comparing it with existing models for generating social behavior in interactive narratives like FAtiMA.

- **Redundancy**
  To ensure the consistency and accuracy of our gaming interface called "roomie roulette," we conducted 107 multiple runs of the application. These runs involved different permutations and combinations of choices made by the user in response to questions asked by non-playable characters (NPCs). Through these tests, we discovered that different winners emerged based on the choices made, with an average score of 120 for the winner. This indicates that the gaming interface is capable of producing varied and unpredictable outcomes, which is important for enhancing the user's engagement and enjoyment.
  Furthermore, we also analyzed the impact of the backstories provided for each NPC on the final winner. For example, we found that if the user's crush was one of the NPCs, that character had some advantage over the other NPCs. This demonstrates the effectiveness of incorporating backstory into the gaming interface, as it adds depth and realism to the interactions between the user and the NPCs.Overall, our testing has validated

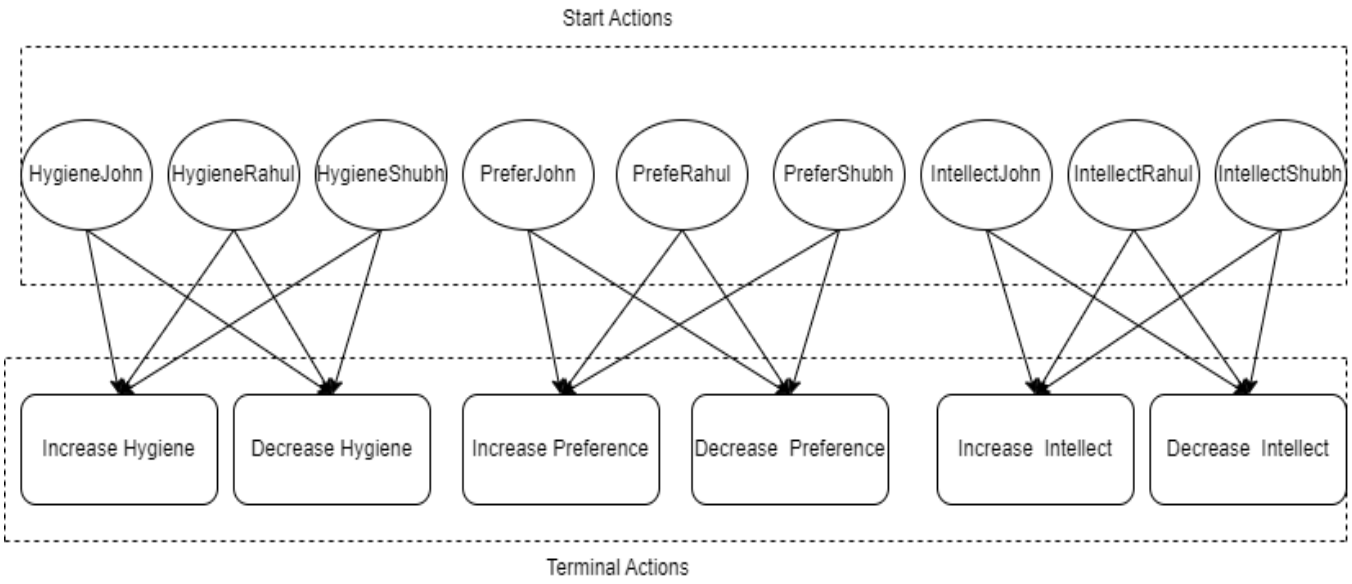

Figure 4. Start actions define the intent of actions and terminal actions are executed to change the social states..

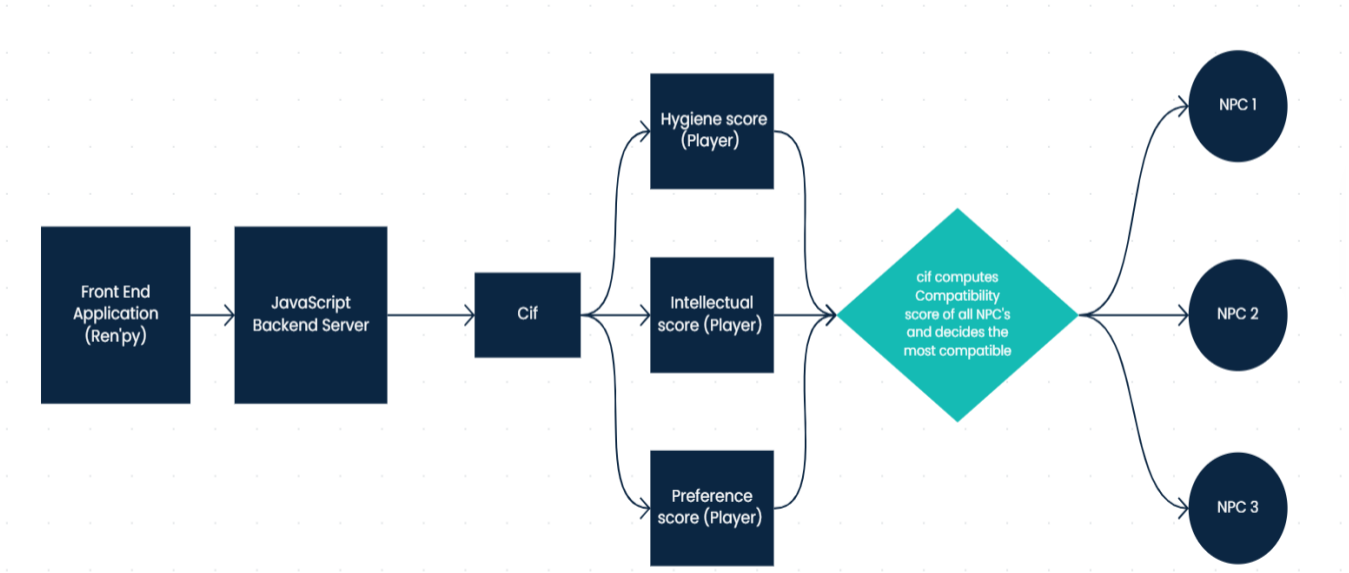

Figure 5. Architecture

the accuracy and effectiveness of our roomie roulette gaming interface under different scenarios. This gives us confidence in its ability to provide an engaging and enjoyable experience for users.

- **Comparison with existing technologies**
  We implemented CIF as the back-end of our Roomie Roulette gaming interface, which allows the social interface of the game to change based on user responses. To evaluate our model's efficiency compared to other existing technologies, we conducted a comparison of CIF to other systems used for generating social behavior in interactive narratives, including FAtiMA, GALATEA, and Proppian. This paper focuses on comparing CIF to FAtiMA as they have similar functionality. Although both CIF and FAtiMA have their strengths and weaknesses in different scenarios, we

found that systems like FAtiMA can be complex to implement when emotional models are unnecessary for decision making. For games that emphasize social norms and conventions, such as Roomie Roulette, CIF is not only easy to implement but also provides a more realistic user experience. CIF's focus on social cognitive theory and its support for fuzzy logic make it particularly suitable for modeling social interactions in games. Its rule-based approach to modeling social behavior can be effective in creating believable and engaging NPCs, and its support for fuzzy logic allows for more nuanced and flexible decision-making. Compared to FAtiMA and other systems, CIF's ease of use and integration make it a better choice for implementing games that emphasize social norms and conventions.

5 Limitations

While the roomie roulette game project has been developed with the intention of providing an engaging and interactive experience through the use of AI, there are several limitations that must be acknowledged. One of the most significant limitations is the current restriction on the number of characters. The game is limited to only three characters, each of which has been predefined with specific preferences and a backstory. This limits the diversity of the game and may result in repetitive gameplay for some users.

Additionally, the game's storyline is predetermined, and the player has limited control over the direction of the story. This may limit the player's engagement and replayability, as they are not able to explore different paths or outcomes.

Limitations of Cif:

- Lack of flexibility: CiF operates based on pre-defined social rules and scripts, which can limit the variety of possible outcomes in the game. It is difficult to introduce new or unexpected social dynamics that are not already captured by CiF's existing rules.
- Over-reliance on data input: CiF requires a large amount of data input in order to accurately model social dynamics. This can be time-consuming and require a significant amount of resources.
- Limited application: CiF is designed specifically for social interactions and may not be suitable for other types of interactions or scenarios.
- Difficulty in debugging: The complexity of the social rules and scripts in CiF can make it difficult to debug errors and identify problems.
- Inability to handle non-social factors: CiF is designed to model social dynamics and may not be able to adequately handle non-social factors, such as physical attributes or environmental factors, that may impact social interactions.

Furthermore, the game's AI algorithm for calculating compatibility scores is currently limited to a set of predefined questions and options. This may not accurately reflect the complexity of real-life roommate compatibility and may lead to incorrect or biased results.

Lastly, the game's backend is currently implemented using a JavaScript server, which may have limitations in terms of scalability and security.

Overall, while the roomie roulette game project has the potential to provide an engaging and informative experience, its current limitations must be addressed to ensure its success and scalability. Further research and development are necessary to enhance the game's diversity, replayability, and accuracy in calculating compatibility scores.

6 Related Works

FAtiMA (Fearnot affective agent architecture)-model is a powerful tool for creating intelligent virtual agents with realistic emotional responses. The model has been extensively tested in various scenarios, demonstrating its effectiveness in simulating human-like emotions and behavior. The FAtiMA model is unique in its ability to combine different theories of emotions and decision-making processes into a coherent architecture, making it a valuable tool for researchers and developers working in the field of affective computing. FAtiMA has been used to develop a wide range of applications, including educational and training systems, virtual reality environments, and gaming scenarios. The model's flexibility and modularity make it adaptable to different contexts and scenarios, and its open-source nature allows for further development and improvement by the research community. Despite its success, the FAtiMA model still has some limitations that require further research. For instance, the model's ability to handle complex social dynamics, such as group interactions, needs improvement. Additionally, the model's computational complexity can limit its scalability in large-scale applications. Nonetheless, the FAtiMA model represents a significant advance in the field of affective computing and has the potential to revolutionize the way we interact with intelligent virtual agents in the future.

GALATEA (Generative Adversarial Learning for Automated Text-Based Emotional Analysis) model represents a significant advance in the field of computational storytelling. By incorporating emotional analysis capabilities into the model, GALATEA allows for more nuanced and emotionally engaging storylines. Through its use of a generative adversarial network (GAN) architecture, GALATEA

can learn from large amounts of labeled emotional data to accurately identify and generate emotional responses. This makes it a powerful tool for generating emotionally engaging and immersive stories, which can be customized to meet the needs and preferences of different users. The GALATEA model has been extensively tested in the domain of computational storytelling, demonstrating its ability to generate storylines that are emotionally compelling and responsive to user input. This has significant implications for various applications, such as video games, virtual reality experiences, and interactive educational materials. Despite its successes, the GALATEA model still has some limitations that require further research. For example, the model's ability to handle complex and diverse storylines needs improvement, and its interpretability and explainability can be challenging. Additionally, the model's performance can be affected by the quality of the training data and the availability of suitable emotional labels. Nonetheless, the GALATEA model represents a significant step forward in the development of emotionally engaging computational storytelling. Its potential for creating immersive and personalized experiences that resonate with users' emotions makes it a valuable tool for a wide range of applications. With continued research and development, GALATEA has the potential to revolutionize the way we tell stories and interact with digital content

The Proppian model has significantly advanced the field of computational storytelling by utilizing Vladimir Propp's morphological analysis of Russian folktales to identify recurring narrative structures and elements essential for crafting compelling and emotionally engaging stories. The model has been widely applied to various domains, including video games, interactive narratives, and educational materials, providing a valuable tool for generating dynamic and adaptive stories that resonate with users.

However, the Proppian model is not without its limitations. One challenge is the model's ability to handle complex and diverse storylines. While the model excels at generating stories that conform to Propp's narrative structure, it may struggle to create narratives that deviate significantly from this structure. Additionally, the model's ability to generate emotionally engaging stories can be limited, as it may not fully capture the nuances and complexities of human emotions and experiences. Another limitation of the Proppian model is its interpretability and explainability. As a black-box model, it can be difficult to understand how the model generates its output and make changes or improvements accordingly. This may limit its applicability in certain domains where transparency and interpretability are crucial, such as legal or ethical decision-making.

Despite these limitations, the Proppian model represents a significant breakthrough in the field of computational storytelling. Its potential for generating dynamic and adaptive stories that resonate with users makes it a valuable tool for creating immersive and interactive digital content. With continued research and development, the Proppian model has the potential to address its limitations and transform the way we tell stories and interact with digital content, offering new opportunities for personalized and engaging experiences that captivate and engage audiences.

7 Conclusion and Future Work

The current game can be expanded to more characters and more complex questionnaires. The visual of the game includes a stationary NPC asking questions, this can be made more lifelike by moving the character. We can add mini-games: To make the game more engaging and interactive, you could add mini-games that the player can play to earn points or rewards. For example, you could add a mini-game where the player has to clean up the apartment before a certain time limit expires. Improve the AI engine: The CiF AI engine can be further improved to make it more sophisticated and realistic. For example, you could add more complex decision-making algorithms that take into account a wider range of factors, such as the player's previous choices and the personalities of the other characters.

In conclusion, our project aimed to explore the effectiveness of using AI and interactive games in facilitating decision-making processes such as roommate selection. Through the development and implementation of a game that presents the player with a set of three NPCs, we utilized customized questionnaires and situational-based questions to calculate a compatibility score with each NPC. We also integrated visual and audio elements such as animations and music to enhance the overall user experience.

Our evaluation showed that the winning NPC depended on the CIF score, the actual values and their range, and that we ran 100 times with randomized inputs and got particular probabilities for each NPC as the winner. However, our research also highlighted some limitations such as the small sample size and lack of real-world data.

Moving forward, we believe that our project has promising potential for further research in the field of decision-making processes and AI-based games. Future work could involve expanding the scope of the game to include more diverse NPCs and incorporating real-world data to improve the accuracy of the compatibility scores. Overall, we hope that our project contributes to a better understanding of the potential applications of AI and interactive games in facilitating decision-making processes.

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