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AI Interior Designing Chatbot

1st Suryaprabha R
Department of Computer Science
(of Affiliation)
Sri Krishna Arts and Science College
(of Affiliation)
Coimbatore, India
suryaprabhar@skasc.ac.in

2nd Rakshana G
Department of Computer Science
(of Affiliation)
Sri Krishna Arts and Science College
(of Affiliation)
Coimbatore, India
rakshu117@gmail.com

ABSTRACT

The AI Interior Designing Chatbot is a clever conversational tool designed to provide personalised design suggestions via organic, engaging interaction. The chatbot can comprehend customer preferences about themes, colours, layouts, and budget by utilising Artificial Intelligence (AI), Natural Language Processing (NLP), and Machine Learning (ML). It can then produce design recommendations that meet these requirements. It acts as a virtual design consultant, bridging the gap between user accessibility and professional expertise.

To deliver design elements that satisfy both practical and aesthetic needs, the system analyses user inputs, determines important preferences, and uses a recommendation engine. Its architecture is based on modules for rule-based reasoning, intent identification, and dialogue management, guaranteeing that the recommendations made are appropriate, workable, and realistic. By offering prompt, reasonably priced, and practical suggestions, the chatbot enhances the interior design process's usability.

This project's primary goal is to provide accessibility to design expertise so that people without technical background knowledge can make well-informed design decisions. In order to improve user interaction and personalisation, future developments might incorporate voice-based input, AR visualisation, and adaptive feedback mechanisms. As a result, this project shows a step towards developing intelligent, user-centred automation in the field of interior design.

Keywords— Artificial Intelligence, Chatbot, Interior Design, NLP, Recommendation System.

INTRODUCTION

The creative industries, including interior design, have been significantly impacted by the rapid advancement of artificial intelligence, which has increased automation, personalisation, and usability. Traditional design methods are unworkable for many consumers since they typically call for expert involvement, entail high expenses, and need lengthy schedules. In order to overcome these obstacles, the AI Interior Designing Chatbot was created as a clever helper that offers prompt, tailored suggestions according to specific

needs.

The chatbot can decipher plain English commands, including a user's preferred layouts, colours, furniture selections, and style, by using Natural English Processing. It then uses recommendation logic and machine learning to produce design concepts that are both aesthetically pleasing and useful. Even those who have never worked in interior design before can get expert advice quickly and interactively thanks to the design. A seamless and organic conversational flow is made possible by the chatbot's general architecture, which combines intent recognition, dialogue handling, and recommendation modules. By providing data-backed, real-time responses, the chatbot reduces the time and effort typically involved in design planning. Thus, the project increases access to professional design guidance making it helpful for hobbyists, architects, and homeowners looking for ideas or helpful advice.

In summary, the AI Interior Designing Chatbot enhances the entire interior design process by combining automation and creativity in a cost-effective, user-friendly, and intuitive manner.

PROBLEM STATEMENT

Functionality, aesthetics, effective space utilisation, and user-specific requirements must all be carefully coordinated in the creative and complex process of interior design. For individualised advice, people have historically relied largely on professional designers; nevertheless, this frequently leads to expensive consultation fees, restricted access, and drawn-out exchanges. It might be particularly difficult for people who have little to no experience with design to envision suitable layouts, choose tasteful colour schemes, or make choices that fit their own preferences while remaining within their means.

Despite the existence of digital design platforms, the majority of current systems are unable to provide intelligent personalisation or conversational interaction. These tools can't accurately interpret user intent or dynamically adjust to changing inputs because they usually rely on static templates or basic rule-based logic. Consequently, they are unable to offer real-time, context- sensitive, or adaptive recommendations.

By fusing machine learning and natural language processing, the suggested AI interior design chatbot aims to address these issues. The system serves as a virtual design assistant that can decipher user input, evaluate individual needs, and provide pertinent and useful advice. This method offers an economical, engaging, and time- efficient way to plan interior spaces while reducing the need for manual consultations.

OBJECTIVES

The AI Interior Designing Chatbot's main goal is to provide an intelligent, interactive platform that facilitates natural discussion among users to assist them construct customised interior design plans. The initiative aims to increase the cost, accessibility, and effectiveness of design consultations by utilising AI and NLP. The system's particular objectives are as follows:

1. To correctly decipher user instructions in plain English and recognise significant preferences, such as room layout, furniture type, colour scheme, and design style.
2. To generate customised design recommendations using a machine learning recommendation engine that strikes a balance between usability and aesthetics.
3. To provide interactive, real-time communication via the chatbot interface, allowing users to modify and improve their inputs as necessary.
4. To lessen reliance on expert designers for initial planning duties by offering a more affordable and approachable substitute.
5. To improve user decision-making by providing thoughtful recommendations that take budgetary, spatial, and style preferences into consideration.
6. To build the system with the ability to add features like voice-based communication, AR/VR visualisation, and interaction with online buying platforms in the future.

By achieving these goals, the chatbot hopes to increase access to professional-level design guidance and enable users to plan, explore, and visualise interior spaces more effectively and creatively.

SYSTEM INTERPRETATION

A. EXISTING SYSTEM

Most consumers in the interior design business today depend on trained designers or get ideas from outside sources like websites, journals, and online communities. Though these might be inspirational, they usually lack customized or interactive training. For many, though, high expenses, scheduling difficulties, and lengthy wait times render professional consultations unworkable.

Generally following set standards and only enabling a limited number of inputs, these systems often provide automated suggestions or pre-made templates via several digital media. Consequently, they cannot understand spoken language, change to personal preferences, or engage in live chat. Consequently, the experience seems cold and unmoving.

These technologies are at a disadvantage as they don't enable consumers with limited technical or design know-how to completely envision opportunities or respond to their particular needs. I often struggle to decide with authority.

B. PROPOSED SYSTEM

The AI Interior Designing Chatbot hopes to bypass these constraints by offering a complex and interactive interface driven by artificial intelligence and natural language processing. Unlike template-based systems, this chatbot lets consumers easily convey their needs and immediately suggests design ideas according on their preferences.

The chatbot manages variables like budget, design taste, color scheme, and furniture style. Using machine learning, the recommendation engine generates advice that is both visually appealing and practical for the surroundings. Because the system's context-aware and adaptive

recommendations, expert designers are no longer needed during the early planning phases.

This method improves decision-making, speeds up the amount of time spent in consultations, and provides rapid help in a unique way. Consequently, more customers could profit from an interior design experience that is more user-friendly, reasonably priced, and easily available.

SYSTEM DESIGN

A. MODULE

The modular architecture of the artificial intelligence inside design bot speeds up the processing of user inquiries and enables simple communication. Six key components of the system work together to offer a tailored design experience.

Users can easily state their needs in the User Interface (UI) module's basic chat-based interface. The analytical center is the Natural Language Processing (NLP) Module, which examines input, determines intention, and gathers design-related information including room type, style, preferred furniture, color scheme, and budget. Combining pre-defined design guidelines with machine learning techniques, the Recommendation Engine produces suggestions that are both visually appealing and useful.

Managing of Communication The module framework guarantees that follow-up questions are answered logically, therefore preserving the natural and context-sensitive flow of communication. The Response Generation Module next transforms the edited data into brief, realistic textual suggestions. Users can evaluate or track recommendations using the Feedback Module, wherein the chatbot learns and enhances its accuracy and customization with time.

With its modular design, this device is adaptable, scalable, and suited for integration of future state-of-the-art features including voice control and interactive AR/VR experiences.

B. INPUT DESIGN

The input design gives top importance to a straightforward, accurate, and successful user experience. Even if they lacked technical knowledge, the chatbot's simple chat interface lets users express their preferences in plain English. A user might write, for example, "I want a cozy bedroom," or "Recommend furniture for a small, contemporary living room."

The NLP component employs techniques including tokenization, entity extraction, part-of-speech tagging, and intent recognition to manage such inputs. Consequently, the system accurately collects the needs of the user's design. It finds information including the room's purpose, architectural style, price range, favored furniture, and color.

Because the chatbot can also manage partial phrases, synonyms, and a range of sentence structures, consumers may naturally express themselves

.C. OUTPUT DESIGN

The goal of output design is to present concepts in a clear, comprehensive, and transparent manner. The chatbot makes well- organized text recommendations for furniture placement, wall paint, room layout, decor, and overall style, based on an analysis of user selections.

For example, if you want to use wood furniture to create a modern and consistent living room that mirrors current trends. The platform utilizes plain text descriptions that are easy to imagine, rather than complex 3D models, making it accessible to users even if they have no prior design knowledge.

Additionally, the chatbot includes interactive improvement so that users may ask follow-up queries or provide other suggestions, resulting in an engaging and interactive design experience. The approach ensures that the design process is enjoyable and productive while still producing results that are tailored to the user's needs, realistic, and useful.

SYSTEM IMPLEMENTATION

Implementing the conceptual design of the system into a completely operational application capable of giving interactive, real-time recommendations is the primary objective of the AI interior design chatbot implementation. For efficient execution, the solution integrates the frontend interface, backend services, NLP engine, and AI modules.

With the assistance of HTML, CSS, and JavaScript, the frontend is developed as a chat interface based on the provision of a chat-based interface through which users can input natural language queries and receive text outputs in real time. The backend is developed using frameworks such as Flask or Django that manage conversational flow, handle requests, and interact with AI modules.

The NLP module does language understanding processes such as tokenisation, entity recognition, part-of- speech tagging, and intent detection through popular libraries such as spaCy and NLTK.

These processes enable the chatbot to identify user needs such as room type, desired styles, furniture choice, colour schemes, and budget constraints with accuracy.

The Recommendation Engine optimizes gathered preferences against appropriate design alternatives through the use of light machine learning techniques in combination with rule-based reasoning. Response latency is minimized since the system is optimized for real-time execution. Operations are performed on a session-by-session basis without storing personal information permanently to maintain user privacy.

While the Dialogue Management Module preserves contextuality across the dialogue, a Response Generation Module transforms processed information into compact and meaningful design suggestions. The chatbot is able to handle multiple queries in parallel, enabling users to iteratively filter their choices. This modularised style makes it easy to integrate with advanced capabilities such as voice interfaces, interactive AR/VR visualisation, and e-commerce integration in the future, as well

as straightforward scaling and upkeep.

USER TRAINING

The user training process ensures that different individuals, such as students, home owners, and design buffs, can use the AI Interior Designing Chatbot easily and without technical knowledge. Even though the system is designed to be simple and intuitive, additional support is provided to ensure proper usage.

The chatbot platform has interactive tutorials and prompt guidance that instruct users to create questions in natural language with details such as the room type, design style, furniture likes, colour schemes, and budget. The courses also demonstrate how to interpret the chatbot suggestions and refine your searches for improved results.

Iterative interaction is also highlighted in training, where users are encouraged to change or rephrase their requests to test different design options. Users can experiment with different designs and arrangements and better know the chatbot's conversational capacities due to this hands- on process. Users become more self-assured with making well-informed design choices by acquiring knowledge on comparing outcomes, altering preferences, and asking for substitutes.

Besides, best practices are also presented such as the incorporation of descriptive keywords, the precise setting of inputs, and the segmentation of complex requests into more manageable steps. This guidance makes the experience smooth and enjoyable while improving the chatbot's accuracy level. The users are capable of utilizing the system effectively using this training strategy, which results in faster decision-making, enhanced creativity, and all-around a more engaging creative process.

MAINTENANCE OF THE SYSTEM

Maintenance is necessary to guarantee the AI interior design chatbot's long-term accuracy, dependability, and seamless operation. Because the chatbot uses artificial intelligence to function, it needs routine system checks and frequent updates to make sure it stays current with changes in technology and design trends. Using natural language processing and intelligence to offer tailored design recommendations.

Maintenance tasks include dataset growth, bug repairs, program updates, and performance optimization. Software maintenance includes updating chatbot frameworks, AI models, and backend code in order to ensure compatibility with the most recent operating systems, browsers, and libraries. All problems brought up regarding the accuracy of suggestions, comprehension of input, or the flow of conversation are addressed right away to prevent interruptions in the user experience.

The chatbot's capacity to make accurate and up-to-date recommendations depends on the dataset's maintenance. As part of maintenance, the knowledge base is updated with new furniture types, the newest design trends, and innovative decorative accessories. Frequent performance testing makes sure that the chatbot answers on time, gives accurate answers, and maintains consistency throughout sessions.

Integrating user input is another crucial element of maintenance. To improve the chatbot's predictive models and conversational logic, user feedback and ratings are analyzed. With the passage of time, the feedback loop allows the system to become more intelligent and flexible.

Regular maintenance improves the chatbot's dependability, efficiency, and usability while also facilitating the integration of future features like multilingual voice and AR/VR- based visualization.

RESULTS AND DISCUSSION

In comparison with traditional design planning methods, the AI Interior Designing Chatbot has shown quantifiable improvements in accessibility, productivity, and customization. Users could outline preferences such as room type, furniture style, color palette, and budget when interacting with the chatbot in regular language while testing the prototypes. Through natural language processing (NLP) methods, the chatbot could understand these questions and generate valuable advice meeting the user's requirements.

Every query was offered multiple options through the system's recommendation engine, enabling users to compare alternatives and progressively refine their choices. The ability of the chatbot to properly interpret their commands, offer helpful suggestions, and continue smooth, context-informed conversations was overwhelmingly complimented by test participants.

Compared to static online materials or standard consultations, the participants also mentioned that the chatbot significantly reduced effort and time required to visualize interior designs. The conversational and interactive nature of the system encouraged creativity and generated curiosity about the design process.

These results indicate how effectively the chatbot closes the gap between non-experts and professionals within a field. It helps individuals with no or minimal design experience to make informed choices by offering inexpensive, friendly, and personalized advice. Although the current version only provides text-based guidance, user testing indicates that voice-based interactivity and AR/VR visualisation could greatly enhance usability and raise the overall design experience in the future.

CONCLUSION

The development of the AI Interior Designing Chatbot is a good demonstration of the potential for natural language processing and artificial intelligence to transform the conventional interior design process. Through the provision of a conversational, user-friendly interface that generates customized design suggestions, the system reduces the requirement for professional designers in routine consultations.

The chatbot effectively converts user inputs, analyzes requirements, and comes up with design ideas that meet functional and aesthetic requirements through the integration of dialogue management, intent recognition, and a machine learning and rule- based logic-driven recommendation engine. Test results indicate that

the chatbot enhances creativity, accelerates decision-making, and simplifies taking multiple options into consideration for layout and décor.

Due to its modular architecture, the chatbot can be readily managed and updated to add more advanced functions in the future, such as multilingual voice interaction, AR/VR visualisation, and e-commerce integration. The system is presented as scalable, adaptable to technology change due to its versatility.

In short, the chatbot opens up access to expert-level design guidance for the audience while also simplifying the design planning process. It signals the widening opportunities of AI-powered conversational systems in creative fields and opens doors for future innovation that marries technology with user- focused design and customisation.

FUTURE ENHANCEMENTS

The AI Interior Designing Chatbot is a solid platform for AI-based design help, but different improvements would extend its impact and application further. Merging augmented reality with virtual reality is one promising direction that would allow individuals to visualize three-dimensional versions of suggested designs in their actual living spaces. It would be easier to judge room layouts, color schemes, and furniture positions before actual implementation through this immersive approach.

Another enhancement is the addition of voice interaction, where users can communicate with the chatbot through providing voice commands. This would enhance the accessibility and usability of the system, especially for those who would prefer not to use it hands-on. By making the chatbot understand and respond in different languages, multilingual support can also expand its global coverage.

Technically, the recommendation engine might be upgraded using advanced deep learning models that were trained on a range of datasets, creating recommendations more accurate and context-sensitive. Integration with the e-commerce platform would bridge the design and implementation divide by allowing consumers to purchase suggested furniture and decor directly. Second, incorporating collaborative capabilities would enable multiple users, such as design teams or household members, to exchange preferences and take decisions in real time.

The chatbot could become an extremely interactive, immersive, and globally adaptable tool by putting these enhancements into practice. This would broaden the impact of AI programs in creative industries such as interior design and further stabilize its position in reducing reliance on professional designers.

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