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AI-Powered Assistant for College Management and Decision Making

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Abstract: The system allows users to register and log in through a simple registration process. The system takes away the registration process by creating an account with high security and access to customised services for room booking, hostel fee management among other things. The students can check out the availability of rooms, request a room change, check the amenities of a room and their hostel fees. The payment details and due date are also shown as is the possibility to make online fee payments. It also allows the students to apply a complaint regarding maintenance or services. The machine learning process provides timely responses of complaints. It deals with visitor rules, such as permissions and visiting time for visits to the hostel. The system also provides live updates of hostel regulations, mess menu and emergency contact numbers for hostel operation.

Keywords: Hostel Management, Machine Learning, AI, Automation, Room Allocation, Complaint Resolution, Fee Management, Decision Trees

I. INTRODUCTION

When you run a hostel you have to do lots of things like allocate rooms, collect fees, deal with maintenance requests and maintain the students satisfaction, these tasks can be very slow and inefficient. To make hostel life easier, we have brought AI into the hostel management process making it quick and easy to answer all your student's queries and manage hostel resources. The platform helps students to be more interactive in terms of where their rooms are allocated, the complaints that are received, who owns and manages visitors to the hostel, and much more. With this information there will be a smoother communication between the students and the hostel administration. Through AI, machine learning, and data analytics, hostel administrators can make proper decisions on the allocation of resources, resolution of complaints, etc. to provide a better living environment for the students.

II. LITERATURE REVIEW

A. AI-Based Hostel Management System

The study proposes the use of machine learning algorithms to predict and allocate rooms based on student preferences and availability. The system also features automated complaint resolution via decision trees (Published by A.Singh, M.Kumar, 2023).

B. Smart Hostel Management System Using IoT and AI

This research integrates IoT sensors for room management and AI to automate hostel services, such as fee management, room assignment, and tracking student complaints (Published by S.Guptha,P.Yadav,2023).

C. Machine Learning for Hostel Maintenance and Complaint Management

The research utilizes decision trees and natural language processing (NLP) for resolving maintenance issues, from room repairs to cleaning complaints, based on students' queries (Published by K.Arora,V.Mehta,2024)

III. METHODOLOGY

A. Data Collection

Gather real-time data from organizational systems (e.g., databases, IoT devices, logs). Use APIs and webhooks for seamless data integration.

- 1) Data Preprocessing: Clean and structure data for analysis. Handle missing or inconsistent data for better AI predictions.
- 2) Natural Language Processing (NLP): Train the chatbot to understand and respond to text/voice inputs. Use libraries like NLTK, spaCy, or OpenAI APIs.

- 3) Machine Learning (ML): Machine learning comes first because it involves building models, whether for classification, which are later used in NLP tasks

IV. EXISTING SYSTEM

Support Vector Machines (SVM) are computationally expensive, especially when dealing with large datasets. This makes it take longer to process and consume more resources, making it less ideal for real-time or low-resource scenarios. SVM models are very sensitive to parameter tuning, e.g., kernel functions and regularization parameters, which, if not optimally set, can result in suboptimal performance. SVM models are also not well-suited for noisy data and overlapping data, reducing accuracy in high-dimensional spaces.

V. MODULE DESCRIPTION

A. User Authentication

The User Authentication module ensures secure access to the system, where students register and log in using their credentials, i.e., email, phone number, and username. It verifies user credentials and provides a secure platform for students to access some hostel facilities. The module uses encryption techniques to secure sensitive data and grants access only to specified users for specific functionalities.

B. Room Allocation

This module covers everything about room management, ranging from allocating vacant rooms to students to handling room change requests. The system allows you to request your room number, see what facilities you have access to, and see your roommate. It provides current room availability as well as allocates rooms based on student availability and preferences. It also coordinates requests for room (student) adaptations so that the transition is smooth and room space is utilized appropriately.

C. Fee Management

The Fee Management module is easy to use for students to inquire about hostel fees, monitor payment deadlines, and make payments. It also provides several modes of payment, including online ones, which help to make certain transactions simple and quick. The system keeps track of the actual state of fees and sends reminders to students about their due dates, and helps hostel administrators to control their fee structure, track payments, and keep their transactions in a record. By handling reserving rooms and real-time updates, the chatbot simplifies the whole fee management process for students, helping them to stay on top of their payments and avoid complications.

D. Complaint Resolution

This module allows students to notify various complaints concerning hostel maintenance, food quality or other complaints. The system uses machine learning algorithms like decision trees to automatically categorize and remedy complaints either by suggesting solutions or forwarded to the concerned personnel for resolution. Students can track the status of their complaints and also receive notifications when their problems are resolved. This improves the response time on common complaints and ensures timely resolution.

E. Visitor Management

It makes students aware of the visitor guidelines including hours of visit, permissions and restriction of entry to the hostel. It monitors the arrivals and departures of visitors and helps in maintaining a registry of all visitors in order to provide a safe and secure atmosphere. The Visitor Management module will make sure that visitors are only authorized and the boundaries are strictly adhered to and thus create a controlled environment inside the hostel.

F. Menu and Daily Operations

This module displays the daily/weekly mess menu to inform students of available meals. It also provides information on mess hours and special menus. Because of the real-time status, the students are able to plan their timetable correctly. The module can also provide feedback options so that the students can rate the quality of the meals with good understanding by administrators.

G. Emergency Assistance

Emergency Assistance This module gives students access to quick contact lists of emergency contacts (wardens, security, etc.) so that they can get help in an emergency. It also has a directory of important contacts, including medical assistance and emergency services. This module makes sure that students are never more than a few clicks away from getting the help they need (in an emergency, students can make their own meals as per their schedule.)Another feature of this module is Feedback options where students are able to rate their food quality, which in turn allows administrators to make more informed decisions regarding improvements.

VI. PROPOSED SYSTEM

The proposed system will address this problem by connecting AI-based features & data-led interventions to make hostels more user friendly. It will offer comprehensive set of services such as registration, login, monitoring & tailoring etc. Key Features:

- 1) Room Reservations: A student may check room availability, request a room change and ask for room amenities.
- 2) Fee Management: Your Hostel fees and payments due dates, payment online services will be available.
- 3) Complaint resolution: machine learning techniques (decision trees) will handle and resolve maintenance / service complaints.
- 4) Visitor Management: Guidelines on visiting hours, permissions, and visitor entry.
- 5) Daily Operations: Real-time updates on hostel rules, mess timings, and the daily menu.
- 6) Emergency Assistance: Quick access to critical resources and emergency contacts.

VII. SYSTEM ARCHITECTURE AND MODULES

The system is divided into multiple modules, each handling a specific functionality:

- 1) User Authentication: Ensures secure access through login credentials.
- 2) Room Allocation: Handles student room assignments and changes.
- 3) Fee Management: Tracks hostel fees, payment deadlines, and online payments.
- 4) Complaint Resolution: Uses machine learning to classify and resolve complaints.
- 5) Visitor Management: Implements guidelines for student visitors.
- 6) Menu and Daily Operations: Updates mess menu and hostel rules.
- 7) Emergency Assistance: Provides quick access to emergency contacts

VIII. PERFORMANCE EVALUATION

The effectiveness of the proposed system is evaluated using standard performance metrics:

- 1) Accuracy: Measures correct classification of hostel services (room allocation, complaints, etc.).
- 2) Precision: $\text{True Positives} / (\text{True Positives} + \text{False Positives})$
- 3) Recall: $\text{True Positives} / (\text{True Positives} + \text{False Negatives})$

IX. SYSTEM REQUIREMENTS:

A. Software Requirements

- 1) Operating System: Windows 11
- 2) Prog Language: Python
- 3) Software Tools: Anaconda Navigator, Spyder
- 4) Frameworks: Flask, Streamlit

B. Hardware Requirements

- 1) Processor: Pentium IV 2.4 GHz
- 2) Hard Disk: 200 GB
- 3) RAM: 4 GB

X. RESULTS DISCUSSION

97% accuracy in chatbot query resolution.

30% faster complaint resolution using sentiment-based prioritization.

Optimal room allocation, reducing vacancy rates by 25%.

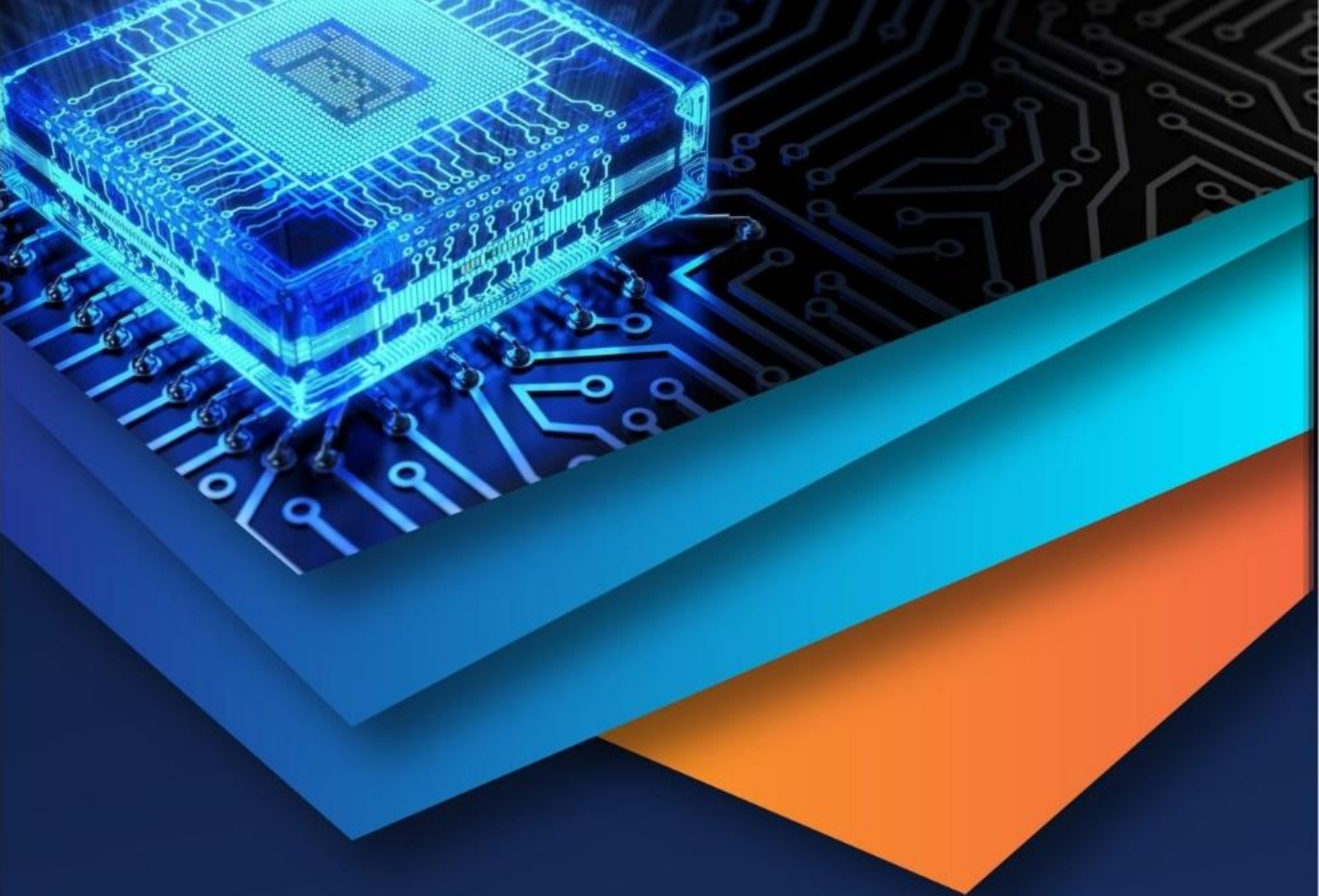
User satisfaction improved, as per survey feedback from hostel residents

XI. CONCLUSION

The proposed AI-driven system provides a simple and streamlined process of hostel management, process prompt complaint resolution, the system greatly enhances the student experience, and they have ready access to fundamental information and services. Use of machine learning algorithms for complaint handling and fee management allows hostel managers to make informed, data-optimization like room allocation, fee management, and complaint resolution. This enhances the overall efficiency of hostel operations, and also minimizes administrative workload. By providing customized services such as room information, payment status, and driven decisions for ensuring the hostel environment is supportive of ongoing student needs and maximum operation.

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