iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 12 **Issue:** IV **Month of publication:** April 2024

DOI: https://doi.org/10.22214/ijraset.2024.61337

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue IV Apr 2024- Available at www.ijraset.com

BOOKEAZY - Book Your Appointments with Ease

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Abstract: ***BookEazy – an Appointment booking application is a type of software that allows users to book appointments with service providers online. Appointment booking applications have become integral tools in modern service industries, facilitating seamless scheduling between clients and service providers. Appointment booking applications offer a number of benefits for both users and service providers. They can also help users to find the best time and date for their appointments, and to track their appointments. For service providers, appointment booking applications can help to improve efficiency and customer satisfaction. By making it easy for users to book appointments, these applications can help to reduce the number of no-shows and cancellations. They can also help service providers to track their appointments and to manage their time more effectively.***
Keywords: Appointment Booking System, Machine Learning, Sentiment Analysis, Web Development, Service Scheduling, Customer Satisfaction

I. INTRODUCTION

A. Background

In an era of digital transformation, the demand for efficient and convenient services has never been greater. The need for an online appointment booking application i.e. BookEazy arises from the growing demand for convenience and efficiency in scheduling various services according to individual needs and preferences. In today's fast-paced world, people often struggle to find the time to make phone calls or visit physical locations to book appointments. Whether it's scheduling a doctor's appointment, reserving a table at a restaurant, or booking a spa treatment, the ability to do so online has become increasingly essential.

One of the primary reasons for the necessity of such a system is the convenience it offers to users. With BookEazy, individuals can easily browse through available time slots and services from the comfort of their own homes or on the go using their smartphones. This eliminates the need to wait on hold or physically visit a location to make an appointment, saving both time and effort for users.

B. Problem Statement

One of the primary reasons for the necessity of such a system is the convenience it offers to users. With BookEazy, individuals can easily browse through available time slots and services from the comfort of their own homes or on the go using their smartphones. This eliminates the need to wait on hold or physically visit a location to make an appointment, saving both time and effort for users.

The current process of scheduling appointments is ripe for disruption. Traditional methods, relying on phone calls, emails, or even physical visits, are cumbersome and prone to inefficiency. From a client's perspective, reaching a receptionist during business hours can be a challenge, and navigating an already booked schedule can lead to limited appointment options. For service providers, managing a constant stream of calls and emails disrupts workflow, and the risk of missed communications or double-bookings creates frustration. This inefficiency translates to lost revenue for providers and wasted time for clients. An appointment booking application is necessary to bridge this gap. By offering a platform for realtime scheduling, automated communication, and a centralized view of availability, such an application can streamline the process for both parties, leading to increased productivity for providers and a more convenient, positive experience for clients.

C. Aim

This appointment booking system aims to revolutionize appointment scheduling by incorporating user booking, service provider selection, and sentiment analysis. Users can conveniently book appointments online, selecting their preferred service provider for specific tasks. On the service provider side, the system efficiently manages schedules and bookings. Additionally, the system leverages machine learning to analyze user feedback through sentiment analysis. This allows businesses to understand customer satisfaction and continuously improve their services. By combining user booking, service provider management, and sentiment analysis, this system creates a streamlined and feedback-driven appointment experience.

D. Objectives

1) *Develop an intuitive and user-friendly appointment booking platform for clients and service providers.*
2) Enable seamless scheduling of appointments based on availability and preferences of both parties.
3) Provide customization options for clients to select specific services and preferred service providers.
4) Allow service providers to manage their availability and service offerings flexibly.
5) Integrate sentiment analysis using machine learning algorithms to analyze user feedback and ratings.

II. LITERATURE REVIEW

Patel Tirthkumar and Vaghela Surajsinh [1] aimed at creating an iOS application that serves as a system to create, manage and allot appointment or meeting slots for a company with other organization's representatives. This could be useful to easily manage and digitally track the meeting schedules for a company that is easily accessible at an executives fingertips. This helps at saving both money and time by reducing the time invested by the staff to manually manage the meeting schedule. Here the authors rightly targeted the fault in the manual system that it takes approximately 15-20 minutes to manage these meetings while these can be easily reduced if digitized that the paper concludes with the development of an iOS application.

Akinode, John Lekan, Oloruntoba S.A [2] have used web technologies like AngularJS for the frontend and Ajax framework for handling client-server requests and for the database they used MySQL and Sqlite3. The entities that would interact with the system are Receptionist, Patient, and the Doctors. The patients login and create an appointment request by selecting the department and the doctor, after the confirmation of the appointment based on the schedule, the patients are notified and have to wait for the availability of the doctor. The major focus was to use AngularJS which is a popular tool for building Single Page Applications that provide good user experience.

Karen Ming Lu, Siti Hafizah Ab Hamid [3] proposes a method for designing a web-based appointment scheduling system using Object WebML (a special language for web application modeling). The authors argue that current methods for developing such systems are haphazard and can lead to maintenance problems. Their solution is to use Object WebML to create a structured approach to design, specifically focusing on a university setting where students and lecturers can schedule meetings. This method leverages the strengths of both traditional information system development and hypermedia authoring, resulting in a more maintainable and efficient system.

Diwakar Gupta, Mr. Brain Denton [4] highlight the need for a more systematic approach to appointment scheduling in healthcare. By optimizing scheduling processes, healthcare providers can improve patient experience, resource allocation, and overall efficiency. Here the authors explored the problems of the existing systems and termed the types of delays that a patient faces in a manual appointment booking system which are virtual and direct or captive waiting times. The system that proposes to prioritize different diagnosis with different importance levels by which the scheduling for the appointments have been tackled.

Cambria, E., Poria, S., Gelbukh, A., & Thelwall, M. [5] explored the three different layers of the sentiment analysis task for a text. The sentiment detection or sentiment polarity detection is the task of analysing the natural language used by humans for intercommunication like spoken english and perceive it as positive or negative. The layers explored were syntactics, sematics and pragmatics. The tasks in the layers were Microtext normalization, Sentence Boundary Disambiguation, POS tagging, Text Chunking, Lemmatization, Word sense disambiguition, Concept Extraction, Named Entity Recognition, Anaphora Resolution, Subjectivity Detection, Personality recognition, Sarcasm detection, Metaphor understanding, Aspect extraction, polarity detection. In summary this paper views the problems that NLP tasks like sentiment analysis have to face with the inputs and provided some guidelines to tackle them.

III. METHODOLOGY

A. Proposed System

Developing a robust appointment booking system for research purposes entails a multifaceted approach that addresses the needs of both clients and service providers. Such a system aims to streamline the entire booking process, from initial inquiry to final confirmation, while also prioritizing user experience and satisfaction. By integrating advanced features like sentiment analysis through machine learning (ML), the system can enhance its functionality by providing insightful evaluations of user feedback.

Fig 1. is a representation of the block diagram of the proposed system. The components of the system are the clients logged in through their devices, the database that stores all the records for each booking request and other entities, backend API that is the server that responds to the client requests, payment gateway that manages the payment requests and verification, finally the sentiment analysis module that is responsible to calculate the sentiment value for received feedbacks.

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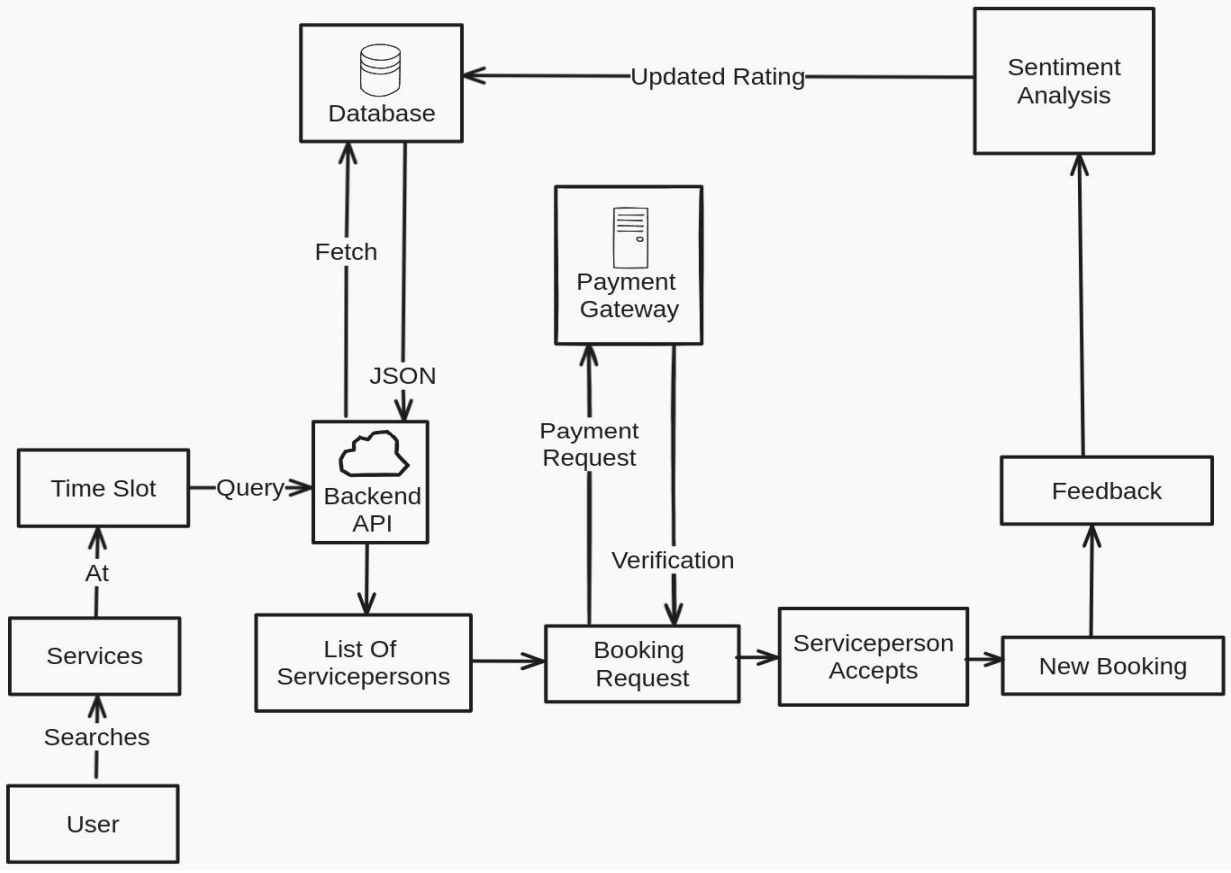


Fig 1. Block Diagram of Proposed System

B. Sentiment Analysis

In the realm of modern service-oriented industries, understanding and gauging user sentiment has become an indispensable aspect of enhancing customer experience and service delivery. In our system, we employ the sentiment analysis capabilities of the sentiment.js library within the Node.js environment to evaluate customer reviews regarding the services provided. This library serves as a crucial component in assessing the sentiment conveyed within textual feedback, offering valuable insights into customer satisfaction levels. Sentiment.js is a popular library in the Node.js ecosystem that specializes in sentiment analysis. This library provides developers with a powerful tool for analyzing the sentiment of text data, making it particularly useful in applications such as social media monitoring, customer feedback analysis, and content categorization.

Under the hood, Sentiment.js utilizes a lexicon-based approach to sentiment analysis. This means that it relies on a predefined list of words and phrases, each associated with a sentiment score, to determine the overall sentiment of a piece of text. The library includes a built-in lexicon containing thousands of words and phrases, along with their corresponding sentiment scores, which has been meticulously curated to provide accurate results across a wide range of contexts. At the core of the sentiment analysis process lies the utilization of the AFFIN-165 dataset, an integral part of the sentiment.js library. The sentiment.js library is a powerful tool designed to facilitate sentiment analysis tasks seamlessly within Node.js applications. Leveraging the library's functionalities, we are able to efficiently analyze the sentiment expressed within customer reviews, providing a quantitative assessment of their opinions regarding the quality of service received. Sentiment is a Node.js module that uses the AFINN-165 wordlist and Emoji Sentiment Ranking to perform sentiment analysis on arbitrary blocks of input text.

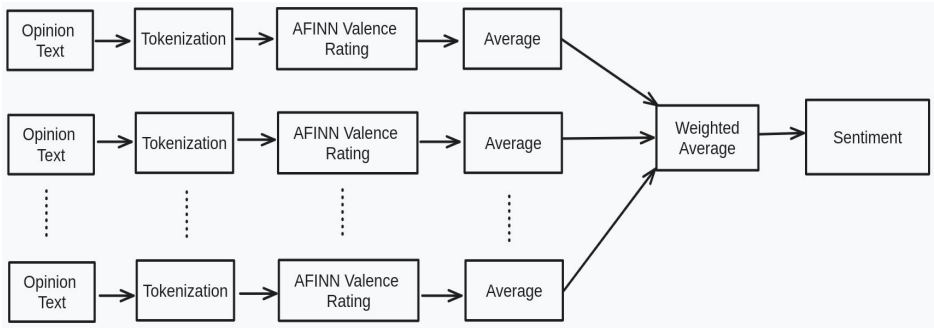


Fig. 2: Sentiment Analysis

Fig 2. represents the steps to be taken for the proposed sentiment analysis module. The different opinions shall be taken in text format and will be tokenized. This tokenized stream of words shall be than calculated for its valence rating based on the AFINN dataset and at last the different opinions sentiment shall be weighted and averaged to obtain the overall final sentiment rating of a feedback for an appointment.

C. Payment Integration

Our integrated payment method within the booking appointment system offers a seamless and secure transaction experience for our users. With user convenience at the forefront, we've carefully selected and integrated a range of payment options to cater to diverse preferences and ensure ease of use. Using a tool Braintree, a robust payment gateway can be implemented.

Moreover, Braintree offers seamless integration with our booking appointment system, enabling swift and efficient transaction processing. With real-time authorization and automated payment handling, users can confirm their appointments without delay, enhancing the overall user experience. Integrating Braintree Direct into our booking appointment system empowers us to accept and process a variety of payment methods seamlessly. With Braintree, our platform can handle transactions involving credit and debit cards, PayPal, as well as popular digital wallets such as Apple Pay, Google Pay, and Venmo (available in the US). This comprehensive suite of payment options ensures that our users can choose the method that best suits their preferences and convenience. Additionally, Braintree is PCI DSS compliant, meaning it adheres to stringent security standards set by the Payment Card Industry Data Security Standard (PCI DSS), further bolstering the security of our payment transactions and instilling trust in our users.

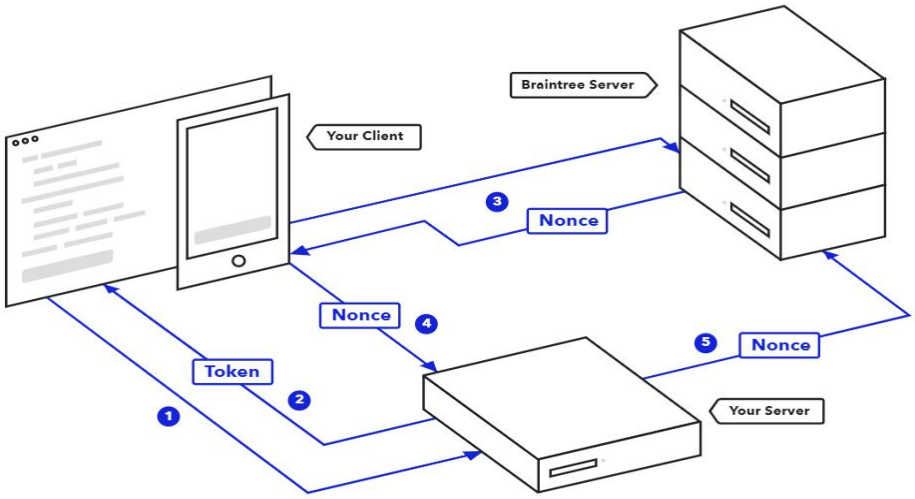


Fig. 3: Working Of Braintree

Fig 3. gives the explanation for the working of the Braintree's payment gateway server.

D. Database Schema and Usage

Databases serve as the backbone of data management systems, facilitating the storage, retrieval, and manipulation of vast amounts of information. MongoDB, a NoSQL database, has emerged as a powerful and flexible solution for handling diverse data types and scaling applications to meet growing demands. In this project, we delve into the realm of databases and explore the functionalities and advantages of MongoDB in addressing the evolving needs of data-centric applications.

MongoDB offers a dynamic schema model that allows for the seamless integration of structured, semi-structured, and unstructured data, making it particularly suited for environments where data structures may evolve over time. Its document-oriented approach stores data in flexible, JSON-like documents, enabling developers to work with data in a manner that closely mirrors their application objects. By embracing a distributed architecture, MongoDB excels in horizontal scalability, effortlessly accommodating the expansion of datasets and user traffic without sacrificing performance. One of MongoDB's standout features is its support for high availability and fault tolerance through replica sets and automated failover mechanisms. This ensures data durability and minimizes downtime, critical for mission-critical applications. Additionally, MongoDB's rich query language and indexing capabilities empower developers to execute complex queries with ease, facilitating efficient data retrieval and analysis.

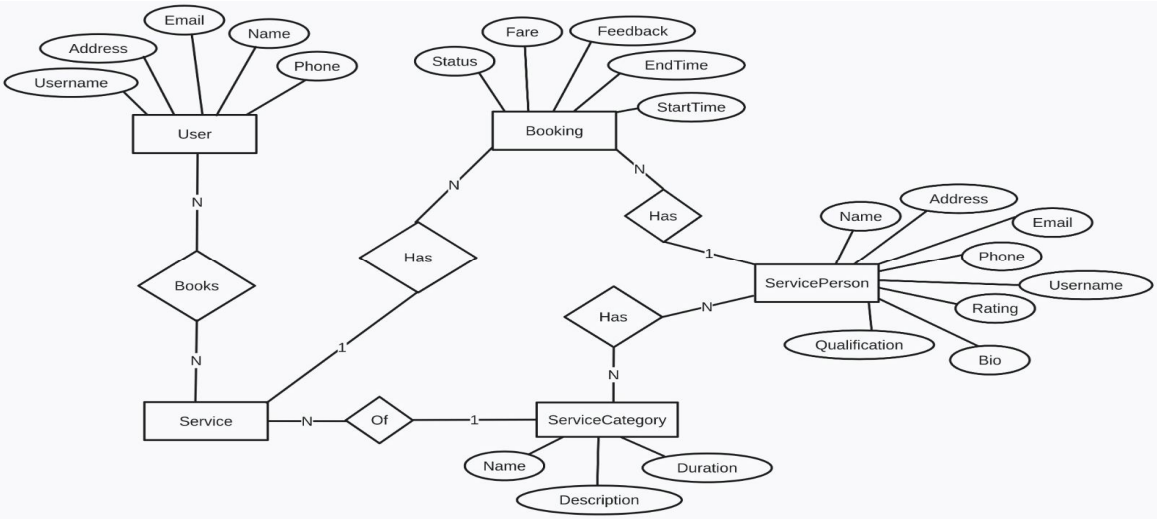


Fig. 4: ER Diagram of Database Schema

Fig. 4 illustrates the ER diagram used to implement the database for the system, there are in all 5 collections implemented in MongoDB with their attributes and relations explained by the figure.

IV. RESULTS

The development of the BookEazy, has culminated in the creation of a robust platform designed to streamline the booking process for both clients and service providers. Through a multifaceted approach that prioritizes user experience, communication, and security, the system aims to revolutionize the way appointments are scheduled and managed.

A. Key Achievements

1) Enhanced User Experience: The client-side interface offers an intuitive and user-friendly experience, allowing clients to effortlessly browse services, view provider profiles, check availability, and book appointments. Similarly, the service provider-side interface empowers providers to efficiently manage their schedules and communicate with clients, contributing to a seamless booking process.

2) Real-Time Availability and Scheduling: The implementation of real-time availability updates enables clients to select suitable appointment times and providers to manage their schedules effectively. This feature minimizes scheduling conflicts and enhances the overall efficiency of the system.

3) Transparent Communication: Clear and transparent communication mechanisms have been established throughout the booking process, from pending requests to accepted or rejected bookings. This ensures that both clients and service providers are well-informed and prepared for upcoming appointments.
4) Secure Transaction Process: Integration of a secure payment system ensures that clients can proceed with payment for services upon confirmation of the booking, fostering professionalism and trust in the system.
5) Comprehensive Review Process: After service completion, the user have the opportunity to provide comprehensive reviews, fostering accountability, transparency, and continuous improvement.
6) Prioritized Security and Privacy: The system incorporates robust data encryption, user authentication mechanisms, and adherence to regulatory guidelines to safeguard sensitive information and build user trust, particularly in fields like healthcare or finance.

B. Sentiment Analysis

Through sentiment analysis, NLP practitioners can delve deeper into understanding the nuances of human language, discerning sentiments that may not be explicitly stated, such as sarcasm, irony, or subtle nuances in expression. In essence, sentiment analysis serves as a cornerstone in NLP, bridging the gap between human communication and machine understanding, thereby unlocking a wealth of insights from the vast sea of textual data. For us this opinion detection is of utmost importance to gauge the satisfaction of the user from their desired service. This analysis has to be done for each subsequent feedback and thus has to be done efficiently.
Lets see an example, let the text be “I love cats, but I am allergic to them.”. Sentimentjs parses the text based on the AFINN dataset and outputs each token’s valence rating and the total comparative valence rating as follows :

```
{
  score: 1,
  comparative: 0.1111111111111111,
  calculation: [ { allergic: -2 }, { love: 3 } ],
  tokens: [
    'i',
    'love',
    'cats',
    'but',
    'i',
    'am',
    'allergic',
    'to',
    'them'
  ],
  words: [
    'allergic',
    'love'
  ],
  positive: [
    'love'
  ],
  negative: [
    'allergic'
  ]
}
```

As we can see, each token has an assigned valence rating and the total score is the summation of the valences of each detected token. Comparitive score is the averaged valence score for all the tokens (positive, negative as well as neutral).

TABLE 1
PERFORMANCE COMPARISON OF SENTIMENTJS

	Short	Long
Sentiment	946,582 ops/sec	3,891 ops/sec
Sentimental (old)	522,901 ops/sec	2,314 ops/sec

From Table 1, it is clear that sentimentjs has a more efficient approach than Sentimental allowing it to perform approximately 70% faster. This makes sure that sentiments are mined without holding the usual request handling by the server. The difference between the two approcahes is the different valance rating datasets used. Sentimental uses the AFINN-111 dataset while the sentiment (current) uses the AFINN-165 dataset. The newer dataset has improved valence ratings and introduces new words and phrases.

TABLE 2
ACCURACY REPORT OF SENTIMENTJS

Dataset	Accuracy
Amazon	0.7262737262737263
IMDB	0.7652347652347652
Yelp	0.6963036963036963

The above Table 2 shows the accuracy report of the sentimentjs module from the renowned and publically available datasets from UCI. The datasets consist of Amazon's product reviews, IMDB movie ratings and YELP's reviews. Since the performance is already very satisfactory and the accuracy close to 70% and the ease of setup and usage, the module is implementable and ready to be use in production.

V. CONCLUSION AND FUTURE SCOPE

A. Conclusion

The development of the Appointment Booking Application signifies a major leap forward in service accessibility and customer satisfaction. This comprehensive platform empowers users with effortless access to a vast array of services, from painting and electrical work to countless others. It simplifies and streamlines the way people connect with skilled professionals.

What truly sets this application apart is its innovative integration of sentiment analysis. This feature promises a more personalized and responsive user experience, unlike anything currently available.

The user-friendly and intuitive interface allows users to effortlessly navigate through a comprehensive list of service providers, enabling them to make informed choices about the experts they hire. Real-time availability updates ensure a smooth and hassle-free appointment scheduling process, minimizing conflicts and maximizing convenience. The strategic marketing plan targets a diverse and dynamic community of users and service providers, poised to propel the service industry towards a digital revolution.

In essence, this project transcends the realm of streamlined appointment booking. It aspires to elevate the service industry by fostering a user-centric ecosystem that prioritizes convenience, personalization, and efficiency. This innovative platform will redefine how we access and interact with professional services.

B. Future Scope

1) Improved Scheduling Convenience: Streamlined online appointment booking for both clients and service providers.
2) Enhanced User Experience: Features like real-time availability, automated reminders, and easy rescheduling.
3) Personalized Service & User Engagement: Sentiment analysis to understand user feedback and personalize recommendations for services and providers.
4) Seamless Integration: Integration with existing workflows like company websites, social media, and calendars.
5) Intelligent Virtual Assistant: Guides clients, recommends providers, and learns from user behavior to suggest optimal scheduling times.

6) Improved Communication: Chat or video features for better client-provider communication before, during, or after appointments.

7) Proactive Appointment Booking: Analyze data and suggest scheduling options to clients, preventing last-minute scrambling.

REFERENCES

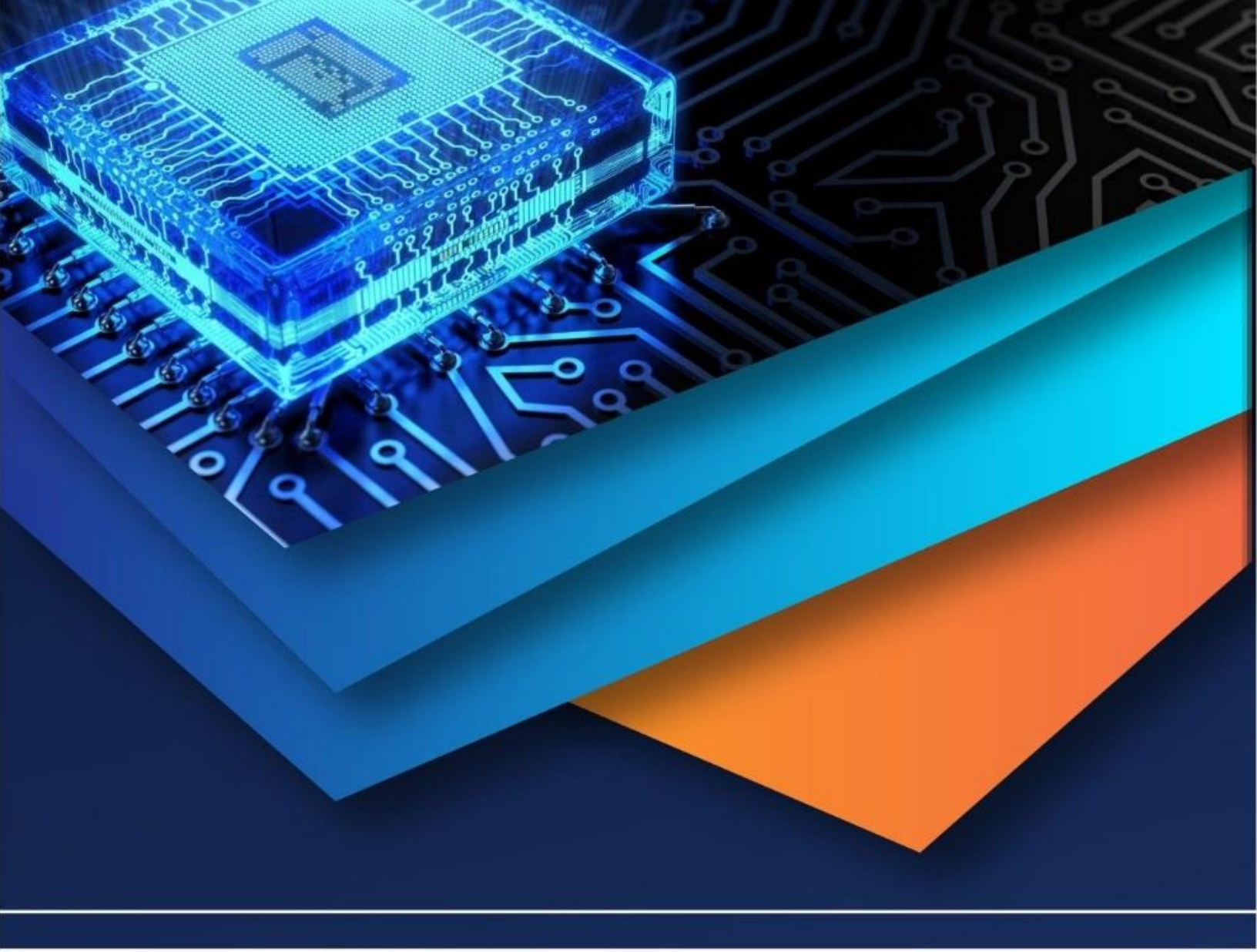
[1] Patel Tirthkumar, Vaghela Surajsinh. "Online Appointment Booking System". International Journal for Research Application & Management. Vol-04, Issue-11, Feb 2019.

[2] Akinode, John Lekan, Oloruntoba S.A. "Design and Implementation of a Patient Appointment and Scheduling System". International Advanced Research Journal in Science, Engineering and Technology. Vol. 4, Issue 12, Dec 2017.

[3] Lu, K.M., Hamid, S.T.A.: "Conceptual Design of Web-Based Appointment Management System using Object WebML". Information Technologies and Applications in Education (ISITAE'07). IEEE Conference Proceeding, pp. 354–359, 2007.

[4] Gupta, D., & Denton, B. "Appointment scheduling in health care: Challenges and opportunities". IIE Transactions, 40(9), 800–819, 2008.

[5] Cambria, E., Poria, S., Gelbukh, A., & Thelwall, M. "Sentiment analysis is a big suitcase". IEEE Intelligent Systems, 32(6), 74-80, 2017.



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