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ConsultSphere: AI-Powered Consultant Recommender Platform

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Abstract –In today's digital ecosystem, individuals and businesses often face challenges in finding reliable, domain-specific consultants. Existing platforms are fragmented, lack intelligent matchmaking, and offer limited trust or verification mechanisms. This paper presents *ConsultSphere* — an AI-powered web-based consultancy platform designed to intelligently connect clients with verified domain experts. Using machine learning techniques such as TF-IDF, the system analyzes consultant profiles and client requirements to recommend the most suitable expert.

The platform offers secure authentication, real-time chat, appointment booking, and personalized consultant recommendations through a user-friendly interface built with React.js and Django REST Framework. MySQL serves as the backend database, while Socket.io enables live communication.

By integrating AI/ML-based recommendation and real-time collaboration, *ConsultSphere* aims to enhance accessibility, reduce search time, and improve the overall consultancy experience. The proposed system demonstrates how intelligent automation can transform the traditional consultation process into a seamless, efficient, and trustworthy digital solution.

Key Words: AI-based Recommendation, Consultant Platform, TF-IDF, Machine Learning, React.js, Django REST API, Real-Time Chat, Web Application, Smart Consultancy.

1. INTRODUCTION

In today's digital ecosystem, the demand for fast, reliable, and expert-driven consultation services has increased dramatically. Individuals frequently seek professional advice—from medical second opinions and legal clarifications to business strategy and academic mentorship. Similarly, organizations depend on industry experts for technical troubleshooting, system deployment, and strategic decision-making. Despite this growing necessity, existing online consultancy systems remain fragmented. Many platforms specialize in only one domain or lack intelligent filtering and verification processes. As a result, users are required to manually search, compare, and validate experts across multiple sites, leading to inefficiency, confusion, and in many cases, a loss of trust.

With advancements in Artificial Intelligence (AI) and Machine Learning (ML), these challenges can be addressed more effectively. Modern AI techniques enable systems to understand user requirements through natural language interpretation, analyze consultant profiles, and identify the most relevant experts using intelligent ranking mechanisms. Text-processing models, such as TF-IDF (Term Frequency–Inverse Document Frequency), allow machines to extract meaningful insights from consultant descriptions and match them with user queries based on relevance and expertise. By utilizing these techniques, the system not only enhances the accuracy of consultant recommendations but also reduces manual effort and decision fatigue for users.

The proposed platform, ConsultSphere, harnesses the power of AI to create an automated, personalized, and secure consultancy ecosystem. Instead of users searching for consultants, ConsultSphere analyzes their requirements and automatically recommends suitable experts across multiple domains. The system integrates profile verification to build trust and incorporates real-time interaction features to support communication between users and consultants. Designed as a scalable and user-friendly web application, ConsultSphere aims to revolutionize the consultancy landscape by centralizing expert services and enabling intelligent matchmaking.

Ultimately, ConsultSphere seeks to transform the way individuals and organizations access expert knowledge—making consultancy faster, smarter, and more transparent. The platform bridges the gap between users and verified professionals while ensuring that expertise is easily discoverable, accessible, and suited to the user's unique needs.

2. FUNCTIONAL REQUIREMENTS

The functional requirements define the key operations and expected system behavior for the *ConsultSphere* platform.

2.1 User Authentication and Registration

The system should allow secure login and registration for Clients, Consultants, and Admins. Role-based access control ensures data security and user-specific functionality.

2.2 Consultant Recommendation Engine

The ML engine uses TF-IDF algorithms to analyze consultant profiles and recommend experts based on clients' domain requirements, skills, and previous interactions.

2.3 Appointment Booking System

Clients can book appointments with selected consultants, view available time slots, and receive notifications for upcoming sessions.

2.4 Real-Time Communication

Using Socket.io**,** the system supports real-time chat between clients and consultants. This enables instant discussion and scheduling flexibility.

2.5 Profile and Dashboard Management

Each user has a dedicated dashboard for profile updates, appointment tracking, and feedback submission. Consultants can manage their schedules, view client reviews, and update expertise.

2.6 Feedback and Rating

After each consultation, clients can rate consultants and leave feedback. These ratings enhance the system's recommendation accuracy.

2.7 AI/ML Analytics

The backend ML module continuously analyzes user activity, improving future recommendation quality. It learns from feedback loops to optimize the consultant-client matchmaking process.

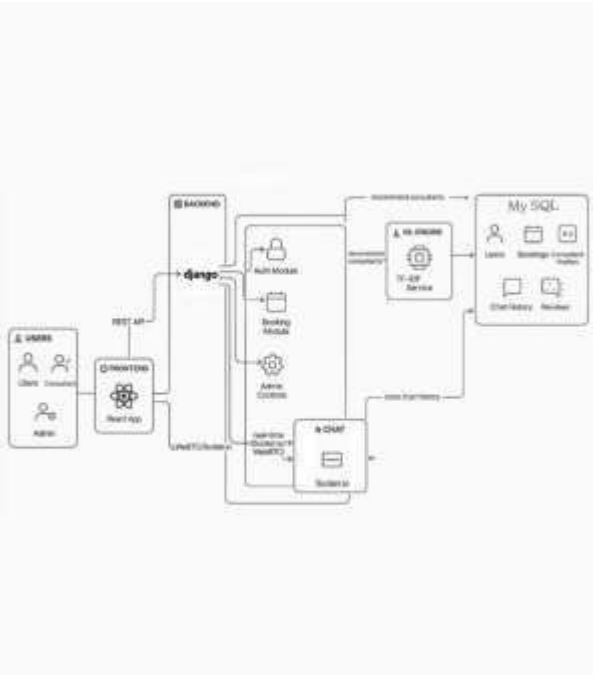
2.8 Security and Data Management

Data confidentiality is ensured using JWT (JSON Web Token) authentication. Sensitive information such as chat history, personal details, and bookings are encrypted and stored securely in the MySQL database**.**

2.9 Cross-Platform Deployment

Built using open-source technologies, *ConsultSphere* can be deployed on both cloud and local environments, ensuring scalability and accessibility from multiple devices.

3. SYSTEM ARCHITECTURE



Description

1. **User Interface Layer (Frontend)**
   Developed using React.js and Bootstrap, providing responsive dashboards for Clients, Consultants, and Admins.

2. **Application Layer (Backend)**
   Implemented using Django REST Framework to manage business logic, API communication, and data flow between frontend and database.

3. **Database Layer**
   Utilizes MySQL to store user data, consultant details, booking history, chat logs, and feedback securely.

4. **Machine Learning Engine**
   A TF-IDF-based recommendation module implemented with Scikit-learn or TensorFlow that matches clients with suitable consultants by analyzing textual similarity.

5. **Communication Layer**
   Socket.io enables real-time chat and notifications between users.

6. **Authentication and Security**
   Uses JWT-based authentication to ensure secure access and prevent unauthorized data exposure.

4. LITRATURE REVIEW

The research paper titled **"Health Consulting Services Recommendation Considering Patients' Decision-Making Behaviors: A CNN and Multi-Armed Bandit Approach"** by Yongbo Ni and Donghui Yang (2025) focuses on improving the accuracy and effectiveness of health service recommendations. The authors aim to develop a system that not only analyzes disease-related features but also considers how patients make decisions while seeking medical consultations. To achieve this, they propose a hybrid framework that combines Convolutional Neural Networks (CNN) with the Multi-Armed Bandit (MAB) algorithm. In this framework, the CNN is used to understand and extract meaningful features from disease descriptions, while the MAB model dynamically learns patients' decision behavior to recommend the most suitable consulting service. The model was tested on data collected from an online diabetes community, and the results showed that the combined CNN-MAB method improved the accuracy and efficiency of recommendations when compared to traditional approaches. However, the study has a limitation: it relies mainly on disease descriptions and patient decision patterns, without considering additional potentially useful information such as social interaction data, patient feedback, or service reviews. Despite this limitation, the proposed model provides an effective direction for personalized health consulting service recommendations by integrating machine learning with behavioral analysis.

The paper titled **"The Impact of Artificial Intelligence on the Consultancy Services Industry: A Comprehensive Analysis of the Role of AI in Enhancing Service Delivery"** explores how Artificial Intelligence (AI) is transforming modern consultancy services. The study focuses on how AI tools and techniques—such as data analytics, automation, predictive modeling, and intelligent decision-support systems—help consultants deliver faster, more accurate, and more personalized solutions to clients. Through a review of existing research, articles, and industry case studies, the authors examine AI applications in different consultancy domains including management, finance, and IT. The paper highlights that AI improves service delivery by enabling better decision-making, reducing repetitive manual tasks, enhancing customer engagement, and increasing operational efficiency. It also points out that consultants can use AI to analyze large datasets, forecast trends, and present data-driven recommendations, ultimately allowing them to focus more on strategic thinking and problem-solving.
However, the study acknowledges certain challenges and limitations associated with AI adoption in consultancy. These include concerns related to job displacement due to automation, ethical issues such as data transparency and privacy, and the possibility of biased outputs from AI systems. Additionally, the research mainly relies on secondary data sources—existing literature and case studies—rather than large-scale primary data, which may restrict the depth of empirical evidence. Overall, the paper concludes that AI has significant potential to revolutionize consultancy services, but responsible and ethical implementation is essential to fully realize its benefits while mitigating risks.

The research paper **"Doctor Consultation through Mobile Applications in India: An Overview, Challenges and the Way Forward"** by Neeraj Agarwal and Bijit Biswas (2020) examines the rise of mobile health (mHealth) applications in India that allow users to either consult doctors online or book offline appointments. The main purpose of the study was to review and analyze the features of these medical consultation apps and understand how they contribute to healthcare accessibility. The authors conducted a cross-sectional, web-based study, where they searched the Google Play Store and initially identified 250 apps related to medical consultation. After applying specific selection criteria, only 22 apps were shortlisted for detailed analysis. The study found that these apps offer various features such as video or chat consultations with doctors, digital prescriptions, appointment scheduling, and sometimes access to diagnostic services or home delivery of medicines. However, the paper also highlighted major challenges. Many users in India still do not have smartphones, internet access, or sufficient digital and health literacy, which limits the use of such apps, especially in rural and low-income areas. Additionally, the analysis was restricted only to apps available on the Google Play Store, meaning apps from other platforms were not included, making the study's findings not fully comprehensive. The paper concludes that while mHealth apps have significant potential to bridge gaps in healthcare access in India, more efforts are needed to improve accessibility, awareness, user trust, and digital infrastructure for these apps to have a wider impact.

The research paper titled **"A Survey on User Authentication Factors"** by *Ali Abdullah S. AlQahtani, Zakaria El-Awadi, and Manki Min* (2021) presents a comprehensive review of different authentication methods used for verifying user identity in digital systems. The authors aim to examine various authentication factors—such as traditional passwords, token-based authentication, biometric systems (fingerprints, face and voice recognition), and contextual factors like geolocation—to understand their effectiveness and security levels. The paper follows a survey-based methodology, where existing authentication techniques are studied and compared based on aspects

like strength, usability, convenience, cost, and vulnerability to attacks. The authors highlight that while each authentication factor contributes to securing user identity, none of them offer complete security on their own. For example, passwords are easy to use but vulnerable to hacking or theft, token-based systems add security but may be lost or stolen, and biometric systems are more secure but involve higher cost and potential privacy concerns. The paper concludes that choosing the right authentication method depends on the system's security needs, user convenience, and risk level, and emphasizes that combining multiple authentication factors (multi-factor authentication) can significantly enhance overall security.

The research paper titled **"AI in Consulting Services: Applications, Challenges, and Ethical Insights"** by *Halima Afroz Lari and Manu K. S.* (2024) provides an in-depth examination of how Artificial Intelligence (AI) is revolutionizing the consulting industry. The study reviews existing literature and real-world implementations to understand the role of AI in enhancing consulting services, improving decision-making, and creating new value for clients. It highlights how AI technologies such as automation, machine learning, predictive analytics, and generative AI are being integrated into consulting processes to reduce manual workload, deliver data-driven insights, develop personalized business strategies, and optimize operational performance for organizations. The paper analyzes success cases from leading consulting firms including BCG, PwC, EY, Infosys, IBM, Accenture, and KPMG, demonstrating measurable gains in productivity, efficiency, and strategic outcomes after adopting AI-powered solutions. Despite its transformative benefits, the paper emphasizes that AI adoption also brings ethical, legal, and practical challenges such as bias, lack of transparency, data privacy issues, and the risk of over-reliance on AI outputs without human judgment. The authors conclude that while AI is reshaping the consulting landscape, ethical and responsible integration—combined with human expertise—is essential to ensure trust, fairness, and long-term effectiveness. They stress that AI should augment consultants rather than replace them, and firms must develop proper governance frameworks, continuous employee training, and ethical AI practices to fully unlock the potential of AI in consulting.

5. CONCLUSIONS

This research demonstrates how AI-driven recommendation systems can revolutionize digital consultancy services. *ConsultSphere* provides a unified and intelligent solution for connecting clients and consultants through automation, real-time interaction, and data-driven matchmaking.

By implementing TF-IDF-based recommendations, secure authentication, and live chat, the system simplifies expert discovery and enhances user experience. It reduces manual effort, promotes verified interactions, and makes consultancy accessible across diverse domains.

Future improvements include integrating BERT-based NLP models for deeper semantic understanding, video consultation support, mobile app development, and blockchain-enabled verification for higher trust and transparency.

Ultimately, *ConsultSphere* aims to redefine the way consultancy is delivered — intelligent, personalized, and efficient.

6. ACKNOWLEDGEMENT

It gives us great pleasure to present our work on "Image-Based Plant Disease Detection". This project aims to help farmers by detecting plant diseases from leaf images, providing solutions like organic treatments, fertilizers, and pesticides, and offering weather information. The system is designed to be user-friendly and works on both web and mobile platforms.

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