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AI-Driven Healthcare System for Doctor Recommendation and Video Consultation Based on Facial Expression and Speech Analysis

Mr. S. Madhavan¹, Mrs. P. Shenbagam²

PG Scholar, Department of Master of Computer Applications, RVS College of Engineering, Dindigul,
Tamil Nadu, India¹

Head & Assistant Professor, Department of Master of Computer Applications, RVS College of Engineering, Dindigul,
Tamil Nadu, India²

ABSTRACT: Telehealth refers to the use of digital technologies to provide healthcare services remotely, enabling patients to consult with healthcare providers without needing to visit physical healthcare facilities. While telehealth offers the convenience of remote access, it faces significant challenges in delivering holistic care, as it often lacks the ability to gauge a patient's emotional well-being or mental state during consultations. Current telehealth systems also fail to offer personalized doctor recommendations tailored to the specific needs of each patient, relying instead on more generalized care approaches. It utilizes Temporal Convolutional Neural Networks (TCNN) for facial expression recognition to assess emotional states and Convolutional Neural Networks (CNN) for speech recognition to capture vocal patterns. Furthermore, Natural Language Processing (NLP) is employed to understand the semantic content of patient speech, enabling a comprehensive analysis of both emotional and physical well-being. professionals best suited to the patient's condition, ensuring a more tailored approach to treatment. The integration of secure video consultation services allows for real-time monitoring and assessment of the patient's facial expressions and speech patterns during the consultation. The system also includes a feedback mechanism to continuously improve doctor recommendations and overall patient care. By providing personalized recommendations and real-time emotional insights, this AI-driven solution addresses the shortcomings of traditional telehealth services. This innovative system marks a significant step forward in telehealth, combining machine learning with human-centered care to deliver a better remote healthcare experience

KEYWORDS: Telehealth, Remote healthcare, AI-powered healthcare, Machine learning, Facial expression recognition, Semantic analysis, Personalized doctor recommendation, Video consultation.

I. INTRODUCTION

Telehealth refers to the delivery of health care over the internet using a range of telecommunications methods. Telehealth technologies include live video conferencing, mobile health apps, save and forward electronic transmission, and remote patient monitoring (RPM). Telehealth is quickly expanding and has the potential to change the way millions of people receive health care. Telehealth technologies, tools, and services are quickly becoming a critical part of the healthcare system. Telehealth is described as the application of telecommunications and digital technologies to offer and facilitate health and health-related services such as medical care, health information services, and provider and patient education.

II. EXISTING SYSTEM

The existing healthcare systems primarily rely on traditional methods for doctor recommendation and online consultation, which often involve manual input from patients regarding their symptoms, medical history, and preferences. These systems typically use static questionnaires or keyword-based searches to suggest suitable doctors, lacking the ability to understand the patient's emotional or psychological state. Video consultations, while increasingly common, do not incorporate intelligent analysis of non-verbal cues such as facial expressions or vocal tone, which are

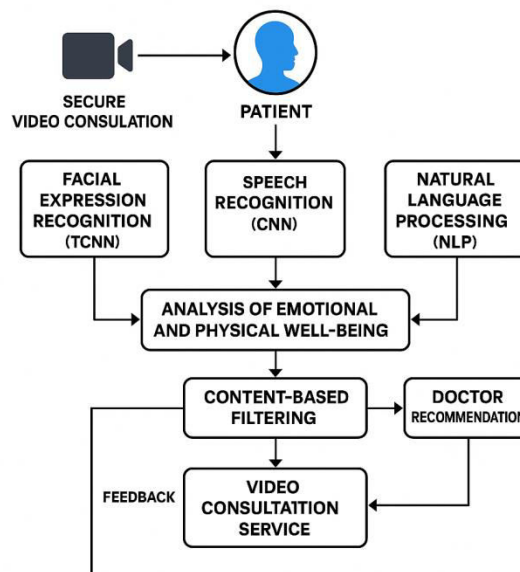
crucial for effective diagnosis and communication. As a result, the current systems are limited in their ability to provide personalized and emotionally responsive care, reducing the overall effectiveness of remote healthcare services.

III. PROPOSED SYSTEM

The proposed system introduces an AI-driven healthcare platform that enhances doctor recommendation and video consultation by incorporating real-time analysis of facial expressions and speech. Utilizing advanced technologies such as facial emotion recognition and natural language processing, the system can assess a patient's emotional state and verbal cues to gain deeper insights into their condition. Based on this multimodal analysis, the system intelligently recommends the most suitable doctor, considering both the medical needs and psychological comfort of the patient.

During video consultations, the AI continues to monitor and interpret facial and vocal indicators, providing the doctor with additional context to support more accurate diagnosis and empathetic interaction. This approach aims to create a more personalized, effective, and emotionally aware telemedicine experience.

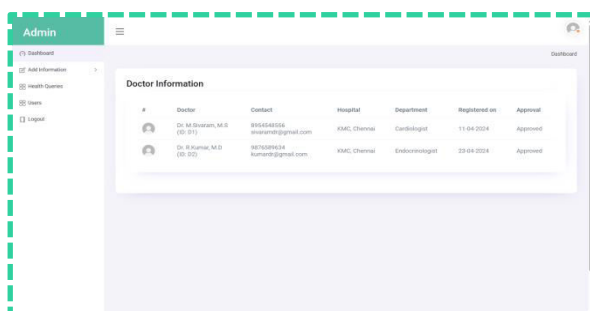
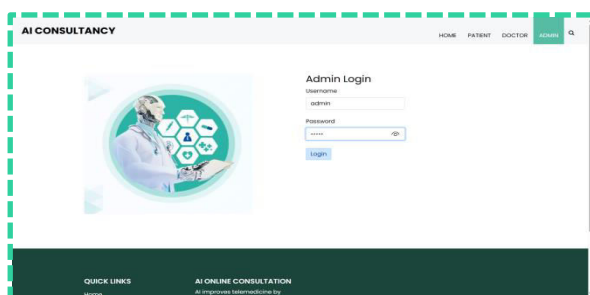
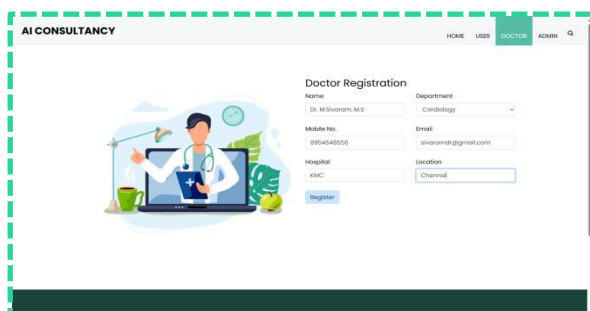
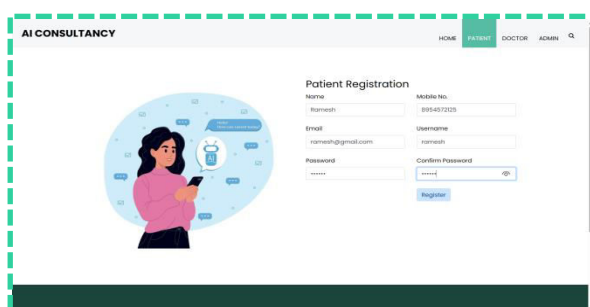
IV. SYSTEM ARCHITECTURE

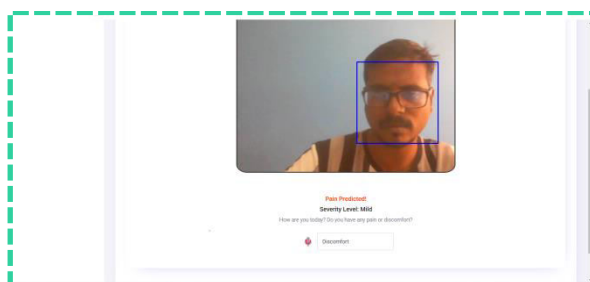
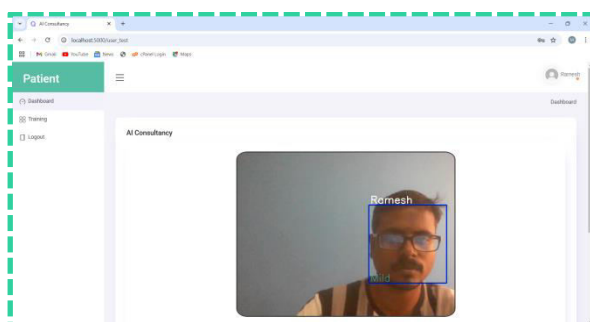
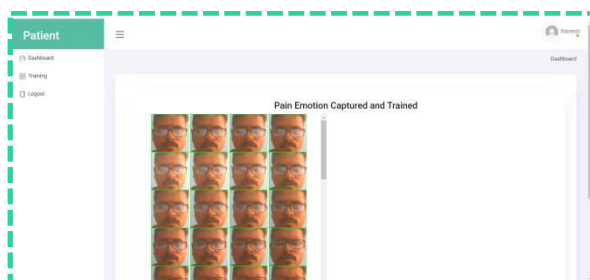
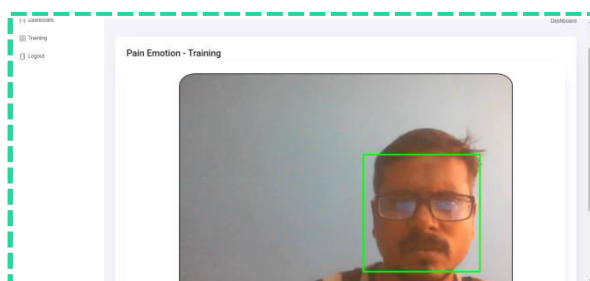
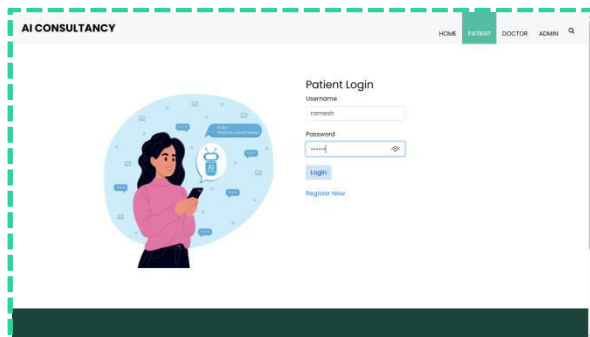


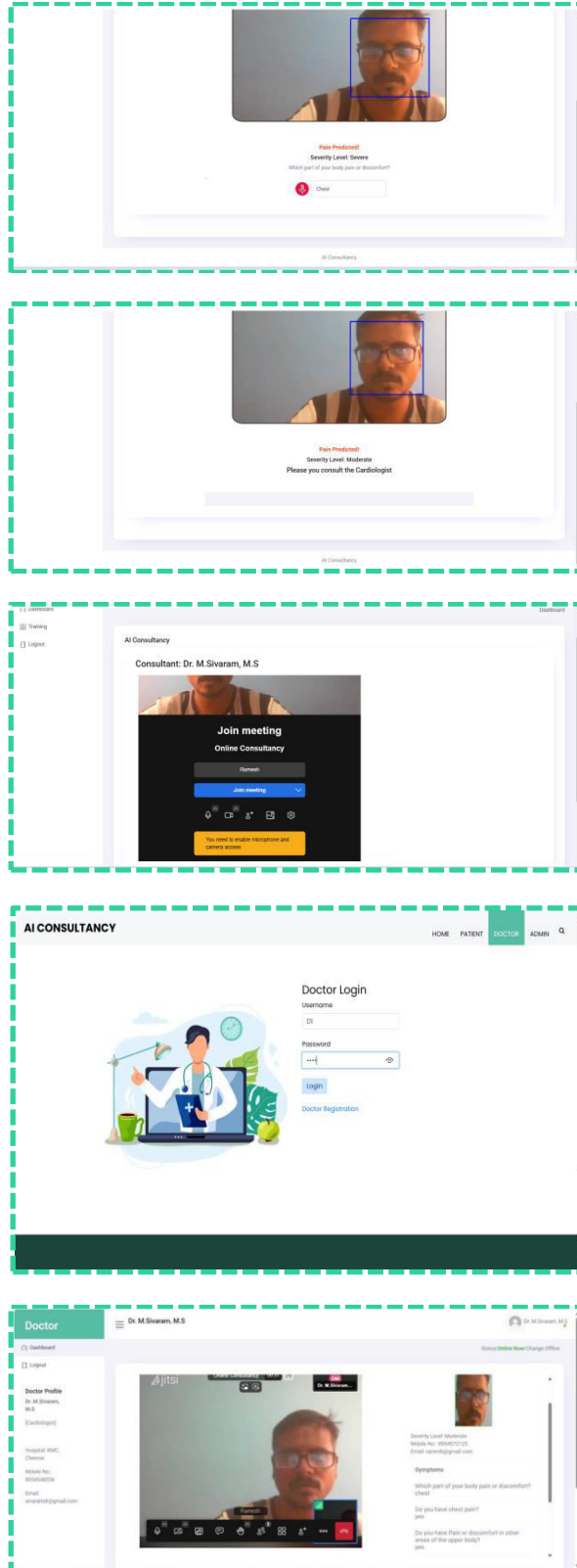
The proposed AI-driven healthcare system leverages multimodal deep learning to enhance the efficiency and personalization of medical consultations. It integrates facial expression recognition and speech emotion analysis to infer a patient's psychological and physical condition. The system employs computer vision and natural language processing to extract emotional and symptomatic indicators, which are analyzed in real-time by AI models. Based on the extracted features, the system intelligently recommends specialized doctors who align with the patient's condition and schedules video consultations through a secure telemedicine interface. The backend includes modules for emotion analytics, symptom interpretation, doctor matching algorithms, and an encrypted communication channel to ensure data privacy and compliance with medical regulations. This holistic architecture aims to improve accessibility, reduce diagnostic delay, and provide empathetic healthcare through intelligent automation.

V. RESULTS

The AI Healthcare Consultant Web App has achieved its objective of providing accurate and timely healthcare predictions. The integration of machine learning models like Random Forest and XGBoost has led to high accuracy levels, offering reliable initial assessments. The user-friendly interface and real-time analysis capabilities enhance accessibility for users, making it effective for preliminary healthcare consultations.







VI. CONCLUSION

In conclusion, the integrated healthcare system harnesses the power of facial expression analysis, speech recognition, and Natural Language Processing (NLP) within a content-based filtering framework to revolutionize patient care. By incorporating advanced AI algorithms, the system offers a personalized, patient-centric approach, ensuring that recommendations for healthcare professionals are both accurate and tailored to individual needs. The dynamic nature of the Content-Based Filtering for Doctor Recommendation module allows for continuous refinement of suggestions based on evolving patient feedback, ensuring ongoing relevance and effectiveness. By prioritizing emotional well-being alongside medical expertise, this system provides a holistic view of patient health, enabling real-time monitoring and assessment during remote consultations. This comprehensive approach not only enhances the quality of healthcare delivery but also empowers patients to make more informed decisions about their well-being. Moving forward, the project sets the stage for continued advancements in AI-driven healthcare solutions. Future developments and collaborations with medical institutions could further improve the system's accuracy, scalability, and impact. Overall, this system represents a significant step toward transforming the future of healthcare, offering a technology-driven, patient-centered approach that addresses both physical and emotional aspects of care.

VII. FUTURE ENHANCEMENTS

The future scope of the AI-driven healthcare system aims to broaden its capabilities by integrating diverse data sources such as biometrics, wearable devices, and environmental inputs for a holistic view of patient health. It plans to employ more advanced AI algorithms to enhance the accuracy of emotional and medical assessments. To ensure data integrity and security, blockchain technology will be adopted. The system will also focus on achieving interoperability with global healthcare networks for seamless data exchange, while expanding access through mobile platforms to support continuous and remote patient care.

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