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AI-POWERED PERSONAL HEALTH RECOMMENDATION SYSTEM

Abdoulie Bawo[1], Sajin Tamang[2], Modou Lewis[3], Aakash Ranjan[4], Sahil Kumar,

Dr. P. M. Gavali[5]

Department of Computer Science & Engineering, D.K.T.E Society's Textile and Engineering Institute, Ichalkaranji[1-5]

1. INTRODUCTION

Healthcare systems across the world are rapidly evolving with the integration of Artificial Intelligence (AI), Natural Language Processing (NLP), and Large Language Models (LLMs). Traditional healthcare systems mainly focus on diagnosis and treatment after the occurrence of diseases, while preventive healthcare and personalized recommendations remain limited. Most healthcare applications provide generalized advice that often ignores individual lifestyle habits, medical history, sleep patterns, fitness goals, and behavioural conditions. Recent advancements in Generative AI have enabled the development of intelligent healthcare systems capable of generating adaptive and context-aware recommendations. These systems can analyze user information such as age, Body Mass Index (BMI), sleep duration, lifestyle habits, physical activity levels, and existing medical conditions to provide personalized suggestions. The proposed AI-Powered Personal Health Recommendation System utilizes Generative AI APIs to generate personalized healthcare guidance dynamically. The system offers recommendations related to diet planning, exercise routines, sleep improvement, medication reminders, and preventive healthcare management. Unlike traditional machine learning approaches that require large datasets, feature engineering, and model training, the proposed framework leverages pretrained Large Language Models through prompt engineering techniques. The system is developed using modern web technologies including Next.js, React.js, Node.js, Express.js, Prisma ORM, PostgreSQL, and Gemini AI API. The framework improves accessibility to healthcare guidance, increases user engagement, and demonstrates the practical implementation of Generative AI in healthcare systems.

2. LITERATURE SURVEY

Artificial Intelligence has significantly transformed the healthcare industry by improving patient monitoring, diagnosis support, recommendation systems, and healthcare accessibility. Many studies have explored the application of machine learning and recommender systems in healthcare to provide personalized medical assistance. Tom M. Mitchell discussed the foundations of machine learning and how intelligent systems can learn patterns from data to improve decision-making processes. Traditional healthcare recommendation systems mainly depended on supervised learning models and rule-based systems. However, these systems required large labelled datasets, continuous model training, and complex maintenance.

F. Ricci, L. Rokach, and B. Shapira explained the importance of recommender systems in delivering personalized suggestions to users based on their preferences and historical behaviour. Recommendation systems have become highly useful in healthcare for providing personalized diet plans, medication guidance, and fitness recommendations. Recent developments in Generative AI and Large Language Models have introduced a new approach for intelligent healthcare assistance. Google Gemini API and OpenAI research publications demonstrate how LLMs can generate contextual responses, understand user inputs, and provide dynamic recommendations without custom model training. Modern web technologies such as React.js, Next.js, Node.js, and Prisma ORM have further simplified the development of scalable AI-powered healthcare applications. These technologies support responsive interfaces, secure authentication, efficient database management, and API integration. Existing systems still face several limitations including lack of personalization, dependency on complex machine learning models, and high computational requirements. Therefore, there is a growing need for an intelligent healthcare recommendation platform that combines Generative AI capabilities with scalable web technologies.

3. METHODOLOGY

The proposed AI-Powered Personal Health Recommendation System follows a structured methodology for generating personalized healthcare recommendations.

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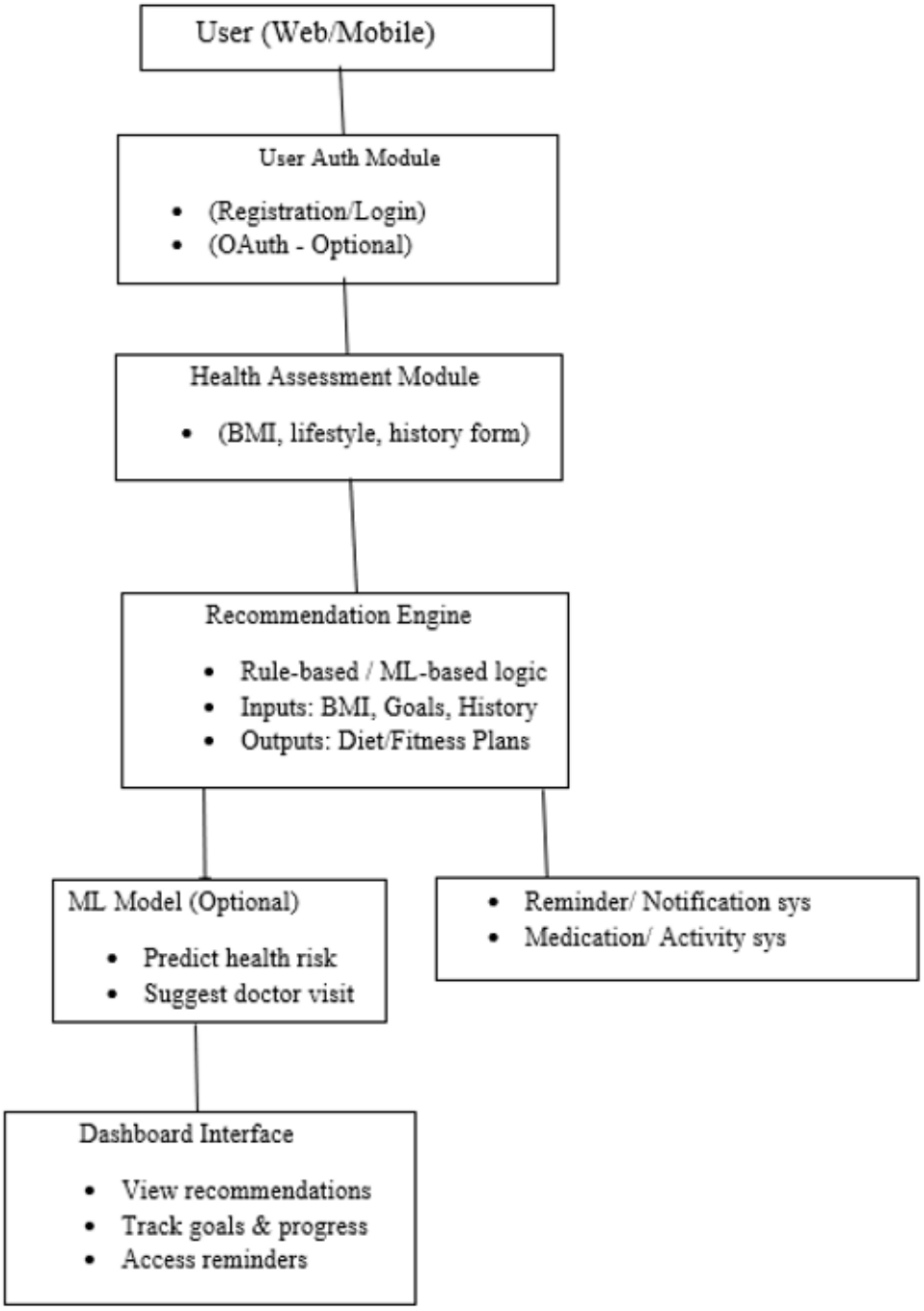

4. RESULTS

The proposed AI-Powered Personal Health Recommendation System was successfully implemented using modern full-stack web technologies and Generative AI integration. The system successfully generated personalized healthcare recommendations based on user health information. The recommendations included: Customized diet plans, Exercise and workout suggestions, Sleep improvement recommendations, Lifestyle modification guidance, and Preventive healthcare advice. The system demonstrated smooth integration between frontend interfaces, backend services, database management, and Gemini AI API communication. The dashboard provided an interactive and user friendly experience where users could: View personalized recommendations, Track health progress, Manage notifications, Access recommendation history. The notification system successfully delivered medication reminders and daily health alerts, improving healthcare management and routine adherence.

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5. RESULT ANALYSIS

The implementation results demonstrate that Generative AI can effectively support personalized healthcare recommendation systems.

5.1 Personalized Recommendation Generation

The Gemini AI API successfully generated context-aware healthcare suggestions based on user-specific data. The recommendations adapted dynamically according to BMI, lifestyle habits, sleep duration, and fitness goals.

5.2 System Performance

The system achieved efficient response generation without requiring complex machine learning model training or dataset preprocessing. The use of pretrained Large Language Models reduced computational complexity and development time.

5.3 User Experience

The dashboard interface developed using React.js and Next.js provided an interactive and responsive user experience. Users could easily access healthcare recommendations and track their progress.

5.4 Advantages of the Proposed System

1. Personalized healthcare guidance
2. Reduced development complexity
3. Real-time recommendation generation
4. Scalable architecture
5. Improved user engagement
6. Preventive healthcare support

5.5 Limitations

Despite its advantages, the system has some limitations:

1. Recommendations depend on the accuracy of user-provided information.
2. AI-generated recommendations may occasionally require medical verification.
3. Internet connectivity is required for API communication.
4. The system does not replace professional medical consultation.

6. CONCLUSION

The AI-Powered Personal Health Recommendation System demonstrates the practical application of Generative AI in healthcare recommendation systems. The framework successfully integrates modern web technologies with Large Language Models to provide adaptive and personalized healthcare guidance. The system generates intelligent recommendations related to diet, exercise, sleep management, and lifestyle improvement using user health information and prompt engineering techniques. Unlike traditional healthcare recommendation systems, the proposed framework avoids complex machine learning model training while maintaining intelligent recommendation capabilities. The implementation highlights the potential of Generative AI technologies to improve preventive healthcare accessibility, enhance user engagement, and provide scalable healthcare assistance. Future enhancements may include wearable device integration, multilingual support, mental health recommendations, telemedicine features, and real-time health monitoring.

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