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Enhancing Diabetes Self-Management Using Agentic AI

A Streamlit Application Approach

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Introduction

Diabetes self-management is critical for maintaining patient health and preventing complications. With advancements in technology, there is an opportunity to enhance self-management tools using artificial intelligence (AI). This project aims to improve an existing Streamlit application for diabetes self-management [1] by integrating agentic AI capabilities, leveraging the MIMIC III dataset, incorporating key elements from information systems (IS) research, and applying the Health Belief Model (HBM) framework [2]. While the common practice of self-management applications is to use rule-based methods, agentic AI offers enhanced personalization, adaptability, and data-driven insights, leading to better user engagement [3] and health outcomes.

Research Question

How can the integration of agentic AI in a self-management application improve diabetes patient outcomes and operational efficiency?

Methodology

Personalized Recommendations and Goal-Setting (Perceived Benefits and Self-Efficacy)

Agentic AI will analyze individual patient data to provide personalized recommendations for diet, exercise, and medication. The AI will set autonomous goals based on the patient's health status and historical data, tailoring self-management plans that adapt to the patient's condition. These proposed plans will be reviewed and adjusted by medical experts (if needed) [3].

- **Perceived Benefits:** Motivational messages and success stories will highlight the benefits of adherence.
- **Self-Efficacy:** Step-by-step guides and virtual coaching will build patients' confidence in managing their diabetes.

Dynamic Monitoring and Alerts (Cue to Action)

Patients will input their daily diet, exercise, and medication intake into the application, or connect it to gadgets like Fitbit and Apple Watch. The autonomous monitoring system will track compliance in real-time, detecting deviations or potential issues such as missed medications. It will send alerts or reminders to both patients and healthcare providers.

- **Cue to Action:** Real-time notifications will act as prompts to encourage adherence to the management plan.

Adaptive Learning and Feedback (Perceived Susceptibility and Severity)

The AI will incorporate a feedback mechanism, offering insights and suggestions based on patients' progress. Through a daily Like/Dislike system, patients can provide feedback on their satisfaction, allowing the AI to adapt and improve its recommendations.

- **Perceived Susceptibility:** Personalized feedback will inform patients of their risk of complications if they do not adhere to their plan.

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- **Perceived Severity:** Educational content will emphasize the seriousness of diabetes and the importance of adherence.

Enhanced Summarization and Reporting (Perceived Benefits and Barriers)

Agentic AI will generate detailed, context-aware summaries of self-management components. By comparing patient data against similar cases and across BMI categories, it will provide valuable insights and actionable advice [1].

- **Perceived Benefits:** Summaries will show patients their progress and the positive impact of their actions.
- **Perceived Barriers:** AI-generated advice will offer solutions to common barriers identified through patient feedback.

Multi-Agent Collaboration (Self-Efficacy)

The application will leverage multi-agent architectures to manage different aspects of patient care, such as diet compliance, medication adherence, and exercise routines. These agents will collaborate to provide a cohesive self-management plan, ensuring all aspects of the patient's health are addressed in an integrated manner.

- **Self-Efficacy:** A supportive environment created by multi-agent collaboration will enhance patients' confidence in managing their condition [2].

Expected Outcomes

- Improved personalization of self-management plans, making them more effective and patient-specific.
- Enhanced real-time monitoring and compliance through dynamic alerts and reminders.
- Increased patient engagement and satisfaction through adaptive learning and feedback.
- Comprehensive summaries and reports that facilitate patient-provider communication.
- A holistic approach to diabetes management through multi-agent collaboration.

Conclusion

This project proposes a significant advancement in diabetes self-management through the integration of agentic AI in a Streamlit application. By addressing personalization, monitoring, feedback, summarization, and collaboration, incorporating key elements from IS research, and applying the Health Belief Model framework, this approach aims to transform how patients manage their condition and how healthcare providers support them. The findings from this project will contribute to the broader understanding of AI's role in enhancing chronic disease management.

References

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