

BATHROOM ACTIVITY LOGGING IN A MOBILE APP: FOUNDATION FOR A RAG-BASED HEALTH AND HYGIENE RECOMMENDER SYSTEM

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ABSTRACT

Advancements in mobile health (mHealth) technology have enabled behavioral monitoring and preventive health interventions, particularly in hygiene-related domains critical to well-being. This study introduces a mobile application which allows users to create a historical log of bathroom activities, including urination, hand washing, tooth brushing, showering, and toileting, using their smartphone or tablet. Analyzing and identifying trends in this data will promote hygiene and support preventive healthcare. Developed using Flutter and Supabase, the app features an intuitive interface with two primary tabs: "event" for logging activities (creating new entries) and "logs" for reviewing and managing past entries. Logged data, including timestamps for activity start and end point, is securely stored in a database for future analysis.

The application is architected to support a Retrieval-Augmented Generation (RAG)-based health recommender system that analyzes activity frequencies and duration to generate personalized health insights, such as detecting early signs of urinary tract infections. During development, a cloud-based Minimum Viable Product (MVP) leveraging LLMs like ChatGPT 3.5 Turbo validates the system's functionality. To address privacy concerns, sensitive data will be processed locally using a RAG deployed on a single board computer like the Raspberry Pi via Ollama, ensuring user data remains private.

This project demonstrates the potential of combining mobile applications with edge AI and privacy-preserving computing to foster healthy behaviors and personalized health management. Future work includes refining recommendation algorithms, expanding activity tracking, and conducting user studies to evaluate the system's effectiveness.

Keywords: mHealth, hygiene monitoring, health recommender systems, privacy-preserving computing, RAG, preventive healthcare.

INTRODUCTION

Advancements in mobile health (mHealth) technology have fundamentally transformed the landscape of health monitoring and management, enabling individuals to take proactive steps towards their well-being [1,2]. However, despite the critical importance of hygiene in public health, it remains an underrepresented aspect in many existing health management tools [3]. This study seeks to bridge this gap by introducing a mobile application specifically designed for logging bathroom activities, thereby promoting better hygiene practices.

The study also seeks to address the need for extracting the rich health insights embedded in patterns and behavioral changes in the frequency and duration of bathroom events [4-6], providing a solid foundation for behavioral monitoring and personalized health recommendations [7]. The significance of hygiene cannot be overstated, as it plays a vital role in preventing diseases and promoting overall health [8]. Research has shown that mobile health applications can effectively facilitate behavioral changes related to hygiene and health management [2,9].