CareConnect: An AI-Based Dementia Care Platform

Abstract:

Dementia and Alzheimer's disease pose significant challenges to older adults who must deal with memory loss, safety issues, and the maintenance of independence. These challenges are presently addressed by digital health interventions that address them individually: some focusing on cognitive stimulation, some on spatial monitoring, and a few on caregiver support; none combining all modalities into one platform. This paper presents CareConnect, an integrated AI-powered platform which combines therapeutic, real-time safety monitoring, and caregiver support services in one application.

Our system is divided into two major components, a patient module and a caregiver module. Patients perform memory-enhancement exercises through natural-language commands or typed input and therefore are free of concerns about accidental errors. Additionally, the platform revolutionizes the concept by integrating personalized interactive photo slideshows, vintage music selections and simple thought-provoking interactive games that encourage cognitive stimulation and emotional bonding. Spatial tracking with geofencing function monitors the patient's position and notifies caregivers of patient deviation from a specified area immediately.

On the caregiver's side, kin can set up daily schedules and thumbtack images and sounds, check if the patient answered mnemonic questions and geofence recalibrations, and monitor detailed analytics of their activities.

First step-wise, a functional web prototype integrating all constituent features was created using React.js with speech-to-text capabilities. It will then be developed further into an Android app, using Java with Android Studio, for better performance, offline support, and integration with native system resources of the device such as geolocation and native notification service.

Google Gemini and BERT speech classification (detects disorientation), speech recognition with acoustic biomarkers (signals cognitive decline), LSTM neural networks (detects abnormal behavior), and probabilistic predictive models (notifies caregivers of upcoming issues) are the AI technologies at work.

In the future, we would like to include more complex diagnostic tools and the embedding of wearable devices which can enable a constant monitoring of the physiology.

What sets CareConnect apart is its unified approach to treatment, safety, and family involvement that actually solves the real-life issues of dementia care that other apps have so far not found a way to solve.

Keywords: dementia care, Alzheimer's Disease, Natural Language processing, Speech Recognition, LSTM Neural Network, Behavioral Analytics, Geofencing, Caregiver Dashboard, Memory games, Patient Safety, Mobile Health, Android Application, Java, Machine Learning