TECH OFFER

Dementia Screening Through Speech Analysis on Mobile App

KEY INFORMATION

TECHNOLOGY CATEGORY:

Healthcare - Telehealth, Medical Software & Imaging

TECHNOLOGY READINESS LEVEL (TRL): **TRL7**
COUNTRY: **SOUTH KOREA**
ID NUMBER: **TO175135**

OVERVIEW

Singapore is an aged society and is set to be "super-aged" in 2026. This means that 21% of the population are 65 years and above. In a recent study conducted in Singapore, 72% had some form of cognitive impairment. The number of young onset dementia is also on the rise in Singapore. This underscores the critical need for early detection and intervention.

However, existing screening tools for dementia have limitations. Their ability to identify Mild Cognitive Impairment (MCI), an early stage of dementia, is limited. Additionally, these tools require specialized instructors for test administration and scoring, which can be inconvenient for seniors who must visit a facility for screening.

This innovative app merges mobile technology with artificial intelligence to address these challenges. It outperforms the MMSE (mini-mental state examination), the most widely used dementia screening test, in identifying both Alzheimer's disease and MCI. Furthermore, the AI-based automatic scoring system provides test results within one minute, eliminating the need for specially trained instructors. This feature makes the app accessible anywhere, including at home.

By enhancing the accuracy, accessibility, and usability of dementia screening, the app aims to facilitate equitable access to essential healthcare resources and contribute to the well-being of individuals and communities.

TECHNOLOGY FEATURES & SPECIFICATIONS

The app screens for Alzheimer's disease and Mild Cognitive Impairment (MCI) early by analyzing the user's speech.

First, the application begins by collecting speech data from the users answering 11 questionnaires measuring each cognitive ability such as short-term memory and numeracy.

Second, the recorded speech files are converted into images using spectrogram generation. Spectrograms convert audio signals into visual representations that show the frequency and intensity of sound over time. This conversion enables the application to capture intricate details and patterns within the user's voice that indicate cognitive changes.

Third, the heart of the application is its proprietary artificial intelligence (AI) algorithm. This algorithm has been trained on a vast

dataset of voice recordings from 1,300 patients through 2 years of clinical studies. It uses deep learning neural networks to identify subtle patterns, variations, and anomalies in the generated images.

Fourth, the AI algorithm analyzes the images to detect specific patterns associated with Alzheimer's and MCI. These patterns include irregularities in pitch, tone, rhythm, pauses, and other vocal attributes that reveal cognitive decline. Through voice-to-image conversion and a proprietary AI algorithm, the app offers a promising avenue for early diagnosis and proactive management of cognitive health.

POTENTIAL APPLICATIONS

The app is tailored for the senior healthcare market with two distinct versions:

1. The first version targets the B2B2C healthcare market, focusing on providers of senior care products and services in both public and private sectors. This version operates independently of medical oversight and does not offer disease diagnosis or numerical health assessments. This will be positioned as a cognitive health monitoring tool to empower care providers to enhance their offerings in the senior care market.
2. The second version is a medical device intended for the B2H channel, including hospitals, clinics, and health check-up centres. This version is currently in the process of obtaining certification from the relevant medical device regulatory authority, such as K-FDA. Once certified, the app can complement or replace existing dementia diagnostic tools such as MMSE and CIST. This capability allows hospitals to expand their range of dementia diagnostic services and generate additional revenue from cognitive health assessments, addressing a gap in the current market offerings.

MARKET TRENDS & OPPORTUNITIES

Dementia is not solely a concern in South Korea but a global challenge. The number of global dementia patients is anticipated to rise from 55 million in 2020 to 139 million by 2050. Some studies even suggest that this figure may surpass 152 million, three times the current number, by 2050 (Washington University School of Medicine's Institute for Health Metrics and Evaluation, 2021). The market size is expected to continue growing with an average annual growth rate of 12.8% over the next six years.

UNIQUE VALUE PROPOSITION

The app pioneers a meticulous approach to cognitive health assessment through acoustic analysis. Unlike traditional methods that rely solely on user responses, it analyses factors such as word intervals, pauses, and pitch variations. This detailed acoustic perspective enables it to detect early signs of cognitive decline, surpassing the limitations of conventional techniques.

Central to innovation is a language-independent algorithm. It effortlessly converts user speech into spectrogram images that vividly depict speech characteristics using colour and brightness variations. This approach breaks down language barriers, adapting seamlessly to diverse linguistic contexts without requiring new algorithms for each language. This adaptability ensures the app serves global communities effectively.

Designed for accessibility and convenience, the app completes screening in just 10-15 minutes using a mobile device—no specialised equipment necessary. This simplicity empowers seniors and caregivers, democratizing proactive health management. The app's portability and user-centric design redefine dementia screening, offering innovative features and universal accessibility that set a new standard in cognitive health assessment.