CMPE 491

Project Specifications Report

Project Name: ***MemorEase***

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1. Introduction

1.1 Description

This project aims to create an AI-integrated mobile application that will help Alzheimer's sufferers improve their memory recall through interactive memory exercises. Patients' relatives can develop a customized database of memories by uploading personal images, videos, and notes. The application will leverage AI-powered Natural Language Processing (NLP) and Computer Vision to analyze these inputs, produce memory-stimulating questions, and allow patients to interact with their past experiences. In addition, based on the patient's answers to the questions asked, will determine which part of the brain is more affected by the disease. Voice recognition, tailored difficulty levels, medication reminders, and health monitoring will all help to support a more holistic approach to patient care.

1.2 Constraints

This project takes into account a number of constraints:
Environmental: Because computational power and storage influence the environment, efficient data processing is necessary.
Social: Designed with a user-friendly interface to facilitate social interaction between patients with cognitive impairments and their families.
Political: Adherence to privacy laws such as GDPR, especially when it gathers private health and memory information.
Ethical: Protecting user confidentiality and obtaining patient permission are essential.
Safety and Health: Integrate health monitoring to ensure patient well-being and prioritize adherence to safety standards.
Manufacturability: Using wearable technology for health monitoring, a mobile application that works with most major operating systems was developed.

1.3 Professional and Ethical Issues

Several professional and ethical issues are covered in this project:
Data privacy: Secure processing and storage of patient data, such as images, private recollections, and medical records, is required.
Patient Autonomy and Dignity: By promoting constructive and non-intrusive interactions, the application should respect patient autonomy.

Transparency: The application's capabilities and limits, especially with regard to AI decision-making, must be communicated to family members and medical experts.
Fairness and Bias: Making sure the AI system doesn't acquire prejudices that can affect the standard of care, such incorrect facial recognition.
Clinical Support: As part of ethical duty, elements such as memory prompts and cognitive exercises must be validated by contacting medical specialists.

2. Requirements

The application's functional and non-functional needs are outlined in this section:

Functional Requirements:

Exercises for Memory Recall:
-NLP-generated queries derived from notes and submitted images.
-Automated assessment of patient replies and voice-based responses.
Photo analysis:
-Computer vision for family member face identification and memory classification (e.g., place, event).
-Hints for memory recall brought on by face or object identification.
Customized Progress Monitoring:
-Adapt the questions' level of difficulty to the patient's prior answers.
-Utilize AI to modify material based on the course of Alzheimer's disease.
Features related to health and wellness:
-Reminders for medications and health tracking via smartwatch connection.
-Relatives receive updates and alerts according to health indicators.
-Cognitive tasks that focus on certain degenerated brain areas.

Non-functional Requirements:

Performance: Real-time processing and reaction times, notably for facial recognition and NLP functions.
Security: Adherence to data protection requirements, such as end-to-end encryption for user data.
Reliability: Consistent functioning with little downtime, compatible with a wide range of devices.
Usability: Features designed specifically for geriatric users, such as easier navigation, bigger icons, and voice help.

Scalability: Refers to the capacity to add or remove functions without causing significant interruptions, as well as possible interaction with other health systems or IoT devices.

3. References

- Alzheimer's Association. “Understanding Alzheimer’s and Dementia,” 2023.
- GDPR Compliance for Healthcare Applications, EU 2018.
- Health IT.gov. “Data Privacy and Security Policy.”
- Anderson, J., et al. “AI in Alzheimer’s Care: Memory and Cognitive Support Applications,” Journal of Healthcare AI, 2022.
- Brown, M., “Ethical AI and Healthcare Technologies: Balancing Privacy and Support,” Ethics in AI Research, 2021.