DEMENCARE

Submitted in partial fulfillment of the requirements of the degree

BACHELOR OF ENGINEERING IN COMPUTER ENGINEERING

By

Alisha Fatima	121A1005
Chinmay Badve	121A1013
Bhagyashree Chikane	121A1014
Annaraj Birajdar	121A1016

Name of the Mentor
Prof. Kalyani Pampattiwar

Department of Computer Engineering
SIES GRADUATE SCHOOL OF TECHNOLOGY
NERUL, NAVI MUMBAI – 400706

ACADEMIC YEAR
2023 – 2024

CERTIFICATE

This is to certify that the Mini Project entitled “Demencare” is a bonafide work of Alisha Fatima (121A1005), Chinmay Badve (121A1013), Bhagyashree Chikane (121A1014), Annaraj Birajdar (121A1016) submitted to the University of Mumbai in partial fulfillment of the requirement for the award of the degree of “Bachelor of Engineering” in “Computer Engineering” .

(Prof. Kalyani Pampattiwar)
Mentor

Dr. Aparna Bannore
Head of Department

Dr. K Lakshmi Sudha
Principal

MINI PROJECT APPROVAL

This Mini Project entitled **"Demencare"** by Alisha Fatima (121A1005), Chinmay Badve (121A1013), Bhagyashree Chikane (121A1014), Annaraj Birajdar (121A1016) is approved for the degree of **Bachelor of Engineering in Computer Engineering.**

Examiners

1……
(Internal Examiner Name & Sign)

2……
(External Examiner name & Sign)

Date:

Place:

CONTENTS

ABSTRACT

Dementia is any decline in cognition that is significant enough to interfere with independent, daily functioning. Dementia is best characterized as a syndrome rather than as one particular disease. The causes of dementia are myriad and include primary neurologic, neuropsychiatric, and medical conditions. It is common for multiple diseases to contribute to any one patient's dementia syndrome. Neurodegenerative dementias, like Alzheimer disease and Dementia with Lewy bodies, are most common in the elderly, while traumatic brain injury and brain tumors are common causes in younger adults. While the recent decade has seen significant advancements in molecular neuroimaging, in understanding clinico-pathologic correlation, and in the development of novel biomarkers, clinicians still await disease-modifying therapies for neurodegenerative dementias. Until then, clinicians from varied disciplines and medical specialties are well poised to alleviate suffering, aggressively treat contributing conditions, employ medications to improve cognitive, neuropsychiatric, and motor symptoms, promote evidence-based brain-healthy behaviors, and improve overall quality of life for patients and families

List of Figures

List of Tables

ACKNOWLEDGEMENT

We would like to express our thanks to the people who have helped us the most throughout the project. We are grateful to our guide **Prof. Kalyani Pampattiwar** and coordinator **Prof. Sunil Punjabi** for their support for the project.

A special thanks goes to each other who worked together as a team in completing the project, where we all exchanged our interesting ideas, and thoughts and made it possible to complete the project with all accurate information.

We also wish to thank our parents for their support and attention who inspired me to go my way. We would also like to sincerely thank our Head of the Department **Dr. Aparna Bannore** and Principal **Dr. K Lakshmi Sudha** for their continuous support and encouragement.

We also would like to thank our other faculty members for providing us with all the required resources and references for the project.

CHAPTER 1
INTRODUCTION

1.1 Introduction

Dementia is a general term for loss of memory, language, problem-solving, and other thinking abilities that are severe enough to interfere with daily life. Diseases grouped under the general term "Dementia" are caused by abnormal brain changes. Dementia symptoms trigger a decline in thinking skills, also known as cognitive abilities, severe enough to impair daily life and independent function. They also affect behavior, feelings, and relationships.

Dementia is not a single disease. It's an overall term to describe a collection of symptoms that one may experience if they is living with a variety of diseases. Dementia is classified into 3 categories that is Alzheimer's, Frontotemporal, and Lewy body.

The main purpose of our project DEMENCARE is to classify the type of dementia a person is suffering from and accordingly suggest exercises, games, and quizzes in order to take care of them so that their condition can improve. It also has a section of memory where the patient's photographic memories are collected and shown to them in order to recall them about their past and improve their condition. Even though there are hospitals that can treat them but this website helps to reach more and more people around the world who may not have enough money to treat or care for themselves or their family **members suffering from dementia**. We should still develop this application to other platforms such as IOS and also shall try to expand our reach and the amount of help we provide. This project can bring a great revolution in India.

1.2 Motivation

1. Due to memory loss and difficulties in daily tasks. The project aims to provide them with a sense of control and accomplishment.
2. Reduced Caregiver Burden: Caregivers often struggle to support dementia patients. An effective app can alleviate some of the burden by assisting patients in their routine tasks. Enhanced Quality of Life: Dementia patients often face frustration and anxiety
3. Cognitive Stimulation: Regular cognitive exercises and memory enhancement activities can potentially slow down cognitive decline and improve brain health.
4. Digital Solutions: In today's digital age, mobile apps are accessible and familiar to many, making them a suitable platform for providing support to dementia patients**.**

1.3 Problem Statement & Objectives

The problem at hand is the growing prevalence of dementia and the increasing burden it places on patients, caregivers, and the healthcare system. Dementia patients experience cognitive decline and behavioral changes, leading to a decreased quality of life and often necessitating long-term care. Caregivers face immense physical, emotional, and financial stress when supporting individuals with dementia. Furthermore, healthcare providers encounter challenges in delivering effective care and support to dementia patients due to the complex nature of the condition. Addressing these issues is critical to improving the overall well-being of dementia patients, enhancing the caregiving experience, and optimizing healthcare delivery for this vulnerable population. This project aims to identify innovative solutions and interventions that alleviate the impact of dementia on patients, caregivers, and the healthcare system, ultimately enhancing the quality of life for individuals living with dementia.

1. **Task Assistance**: Create a platform that guides dementia patients through daily tasks such as medication reminders, appointments, and routine activities.
2. **Memory Enhancement**: Develop exercises and games that stimulate cognitive function and memory recall to slow down cognitive decline.
3. **Communication Aid**: Incorporate features for improved communication, including visual cues, simplified interfaces, and quick access to important information.
4. **User-Friendly Interface**: Design an intuitive and user-friendly interface that is easy for dementia patients to navigate.
5. **Personalization**: Allow customization based on the individual needs and preferences of each patient.
6. **Data Privacy**: Ensure that the app maintains the privacy and security of sensitive user information.

1.4 Organization of report

• Chapter 1 gives the overview of the background and context of the project, the problem statement and research questions, the objectives and scope of the project, brief overview of the methodology used.

• Chapter 2 gives the review of relevant literature on dementia, analysis and comparison of various

techniques and approaches, and Identification of gaps and limitations in existing research.

• Chapter 3 describes the proposed system and explains how drawbacks will be overcome, the architecture and explanation of algorithms and techniques used for creating the project and data ownership, discussion of the tools and technologies used.

• Chapter 4 presents the results of the project, a comparison of results with objectives and research questions.

•Chapter 5 summarizes the key findings and conclusions, suggestions for future research.

CHAPTER 2
LITERATURE SURVEY

2.1 State of Art:

It is about explanation of the Effects of Exercise on Cognitive Function in Dementia Patients. Exercise has been recognized as a potential non-pharmacological intervention that may positively impact cognitive function in dementia patients. Several studies have investigated the effects of exercise on individuals with various forms of dementia, including Alzheimer's disease, vascular dementia, and other related conditions. Investigation in the 2018- Journal of Alzheimer's Disease Shows the impact of exercise on cognitive decline, studies focus on the specific cognitive domains affected and the mechanisms underlying improvement.[1]

It has given a Systematic Review of Exercise Programs for Individuals with Dementia is a comprehensive and structured method used to analyze and synthesize the existing evidence on a particular topic. A systematic review of exercise programs for individuals with dementia involves a meticulous and unbiased examination of various studies, trials, and research articles that focus on exercise interventions specifically designed for individuals diagnosed with dementia, reviews the different exercise interventions for dementia patients,2019-Gerontology and Geriatric Medicine lacks a detailed analysis of adherence rates and the role of caregiver involvement in these programs[2]

The Role of Physical Activity in Reducing Behavioral Symptoms in Alzheimer's Disease and psychological symptoms are common in Alzheimer's disease, with agitation and aggression being prevalent. Studies have suggested that engaging in regular physical activity and exercise may have a positive impact on managing these behavioral symptoms. Explores the relationship between exercise and behavioral symptoms in Alzheimer's patients it addresses the impact of exercise on specific behavioral symptoms like agitation and aggression in 2020-International Journal of Geriatric Psychiatry[3]

The 2017-Neuroscience Research mentioned about Neurobiological Mechanisms Underlying the Cognitive Benefits of Exercise in Dementia Investigates the neurobiological changes induced by exercise in dementia patients. Exercise has been associated with promoting the generation of new neurons (neurogenesis) in the brain, particularly in the hippocampus, a region critical for memory and learning. This process is fundamental in supporting cognitive function.

There is limited research on the long-term neurobiological effects of exercise in different dementia subtypes[4]

The importance of Adherence to Exercise Interventions in Journal 2021- Journal of Aging and Physical Activity for People with Dementia. The review would likely highlight various obstacles that individuals with dementia face in adhering to exercise interventions. These may include cognitive impairment, physical limitations, lack of motivation, environmental factors, and challenges related to communication and comprehension. A Systematic Review Examines factors influencing adherence to exercise programs for dementia patients. More research is needed to identify effective strategies to improve adherence and individualized exercise plans[5]

It has explained us about Family Involvement in Exercise Programs for Dementia Care: in the 2019 International Journal of Dementia Care. Involving family members in exercise programs for dementia care can significantly enhance the effectiveness and overall well-being of individuals living with dementia. Family involvement can help ensure consistent and regular engagement in exercise routines. By providing encouragement and assistance, family members can contribute to maintaining a structured exercise schedule. A Scoping Review focuses on the role of family in supporting exercise interventions There is a gap in understanding the influence of family dynamics and cultural factors on participation.[6]

This has given the Safety Concerns in Exercise Interventions for Dementia in 2018-Aging and Mental Health Conference. Dementia may affect an individual's gait, balance, and coordination. Exercise interventions need to consider these limitations to avoid falls and injuries. Utilizing assistive devices or providing supervision can help mitigate risks. A Critical Review Explores the safety considerations in implementing exercise programs. Limited research discusses safety concerns for advanced-stage dementia patients and those with comorbid conditions.[7]

Table 2.1: Overview of Literature Survey

Sr. no	Paper Title	Journal/Conference Name and year	Problem Addressed	Gap Identified
1	"Effects of Exercise on Cognitive Function in Dementia Patients"	2018-Journal of Alzheimer's Disease	Investigates the impact of exercise on cognitive decline in dementia patients.	Limited studies focus on the specific cognitive domains affected and the mechanisms underlying improvement.
2	"A Systematic Review of Exercise Programs for Individuals with Dementia"	2019-Gerontology and Geriatric Medicine	Reviews the different exercise interventions for dementia patients.	Lacks a detailed analysis of adherence rates and the role of caregiver involvement in these programs.

3	"The Role of Physical Activity in Reducing Behavioral Symptoms in Alzheimer's Disease"	2020-International Journal of Geriatric Psychiatry	Explores the relationship between exercise and behavioral symptoms in Alzheimer's patients.	Few studies address the impact of exercise on specific behavioral symptoms like agitation and aggression.
4	"Neurobiological Mechanisms Underlying the Cognitive Benefits of Exercise in Dementia"	2017-Neuroscience Research	Investigates the neurobiological changes induced by exercise in dementia patients.	There is limited research on the long-term neurobiological effects of exercise in different dementia subtypes.
5	"Adherence to Exercise Interventions for People with Dementia: A Systematic Review"	2021-Journal of Aging and Physical Activity	Examines factors influencing adherence to exercise programs for dementia patients.	More research is needed to identify effective strategies to improve adherence and individualized exercise plans.
6	"Family Involvement in Exercise Programs for Dementia Care: A Scoping Review"	2019-International Journal of Dementia Care	Focuses on the role of family in supporting exercise interventions.	There is a gap in understanding the influence of family dynamics and cultural factors on participation.
7	"Safety Concerns in Exercise Interventions for Dementia: A Critical Review"	2018-Aging and Mental Health	Explores the safety considerations in implementing exercise programs.	Limited research discusses safety concerns for advanced-stage dementia patients and those with comorbid conditions.

2.2 Research challenges

Several limitations may be associated with our Demencare project.

1. Language and Cultural Barriers: Language barriers could limit the reach of the website, especially if the content is only available in certain languages. Cultural differences might affect the relevance and understanding of the information provided.

2. Reliability and Credibility of Information: Maintaining the accuracy of information can be challenging, as the field of dementia research and care is continually evolving. Outdated or incorrect information could mislead or confuse visitors.

3. Technological Literacy and User Interface: Some older individuals, who are more likely to be affected by dementia, might struggle with using or navigating the website due to limited technological literacy or difficulties with the user interface.

4. Vast Spectrum of Conditions: Dementia comprises various conditions (such as Alzheimer's, vascular dementia, Lewy body dementia), each with unique characteristics, progression, and care needs. Addressing this diversity in content might be challenging.

2.3 Research Objectives

Assessment of Information Needs to determine the information and resources sought by individuals diagnosed with dementia, caregivers, healthcare professionals, and those seeking general knowledge about dementia., and explore the challenges faced by individuals affected by dementia to tailor content that addresses their specific concerns and needs.

Curating Reliable Information to collect, verify, and organize up-to-date, evidence-based information from reputable sources to create a comprehensive resource hub. Adaptation for Readability to Modify content to be easily understandable for individuals with varying levels of cognitive impairment, ensuring clarity and simplicity in language and presentation.

User Feedback Collection to establish mechanisms to gather feedback from users, evaluating the website's usefulness, ease of navigation, and clarity of information, and continuous Improvement to Implement strategies to address identified issues, improve content, and optimize the website's structure based on user feedback and ongoing research finding

CHAPTER 3
PROPOSED SYSTEM

3.1 Proposed System :

The healthcare project Demencare is a platform where Dementia patients can take care of themselves. First of all the user has to register for an account in the project The registration process includes personal information such as name, email address and password. This step avoids spam users on the project as only verified users will be able to access the project. Next the webpage is directed here the user first has to fill out a form in order to understand which type of dementia they are facing.

The output of the form classifies the type according to the ratings given. It then suggests us the exercise according to the the type of dementia we are facing. It also includes quizzes for the same. It also has video clips for making it easy for them to understand. It also has a section that involves the memory of the user where we have their photographs so that they can recall their happy moments.

Overall, the proposed Demencare website system is user-friendly, easy to navigate, and secure.

3.2 Architecture :

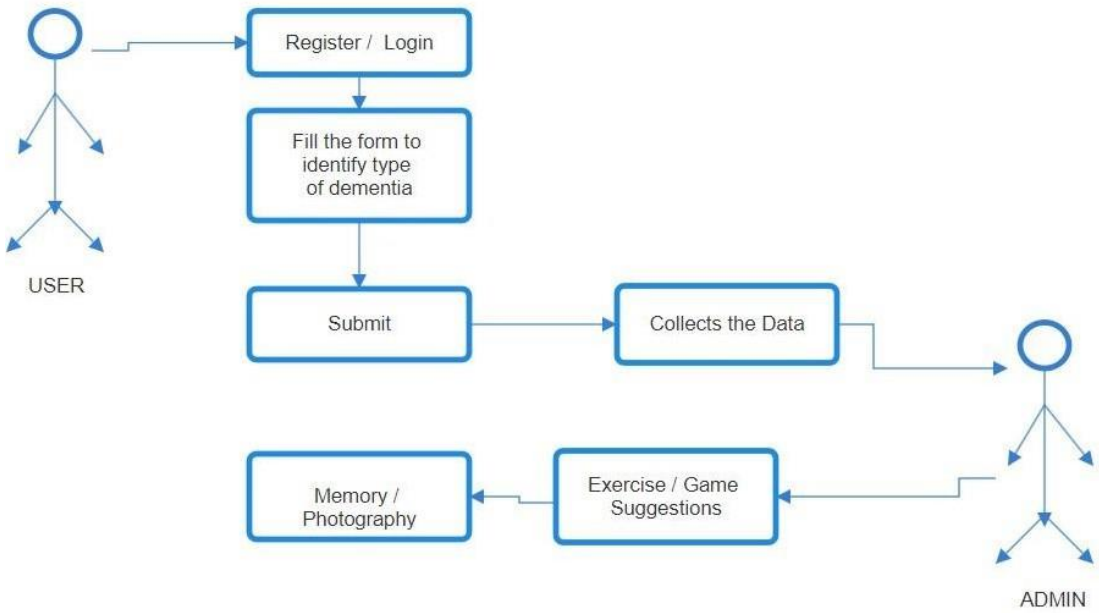

Figure 3.1 Process Overview

3.3 Algorithm and Process Design :

Before diving into the Algorithm, we should see the process design and the technologies involved in it.

Languages and framework used in this project are-

HTML- HTML stands for hypertext markup language, it is the standard markup language for web pages that define the structure of the content. It allows the users to create and structure sections, headings, links, paragraphs, and more, in a website using various tags and elements. Almost everything you want to create/add on a web page can be done using a specific HTML code.

CSS- Cascading Style Sheets, it is the coding language that gives a website its look and layout. Without it, websites would still be plain text on white backgrounds.

JavaScript- It is a scripting or programming language that allows you to implement complex features on web pages. Alongside HTML and CSS, which are structure and style languages, respectively, it is fundamental to building a user-friendly and visually appealing product.

MongoDB- MongoDB is ideal for cloud computing. Cloud-based storage needs to easily distribute data across multiple servers, which suits MongoDB's nature perfectly. You need your data fast and easily accessible As a document database, MongoDB makes it easy for developers to store structured or unstructured data. It uses a JSON-like format to store documents.

Node JS- It is used for server-side programming, and primarily deployed for non-blocking, event-driven servers, such as traditional web sites and back-end API services, but was originally designed with real-time, push-based architectures in mind

CHAPTER 4
DESIGN AND METHODOLOGY

4.1 Methodology

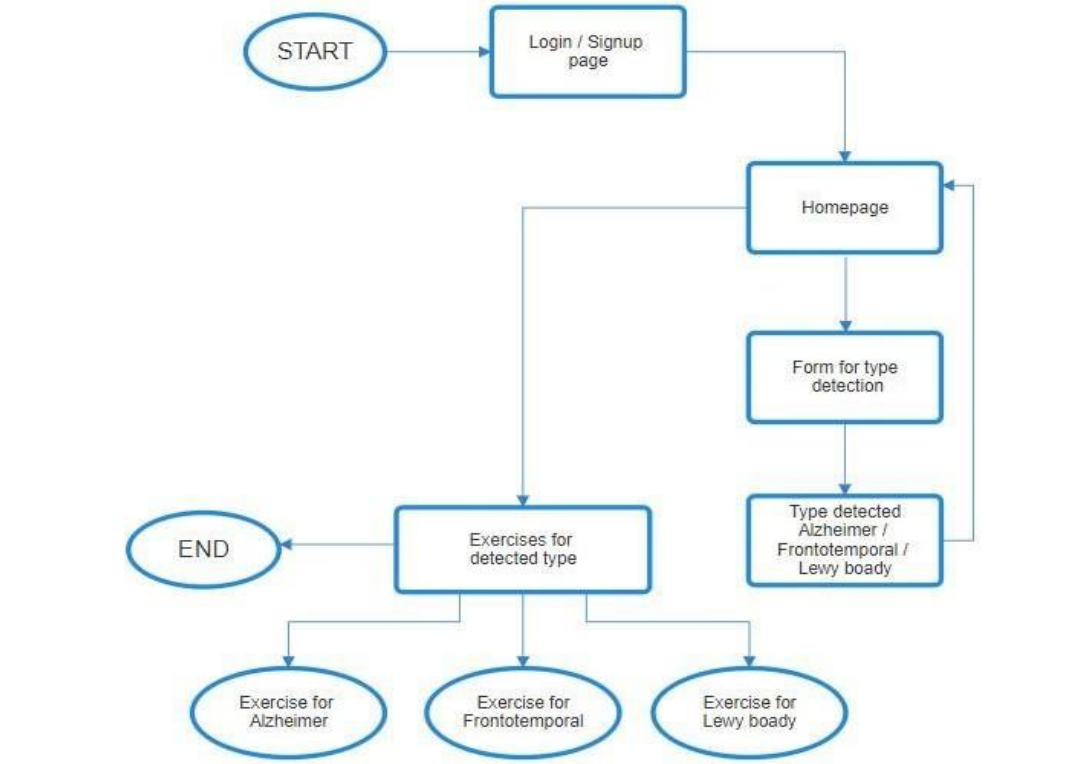

Figure 4.1: Methodology for Proposed System.

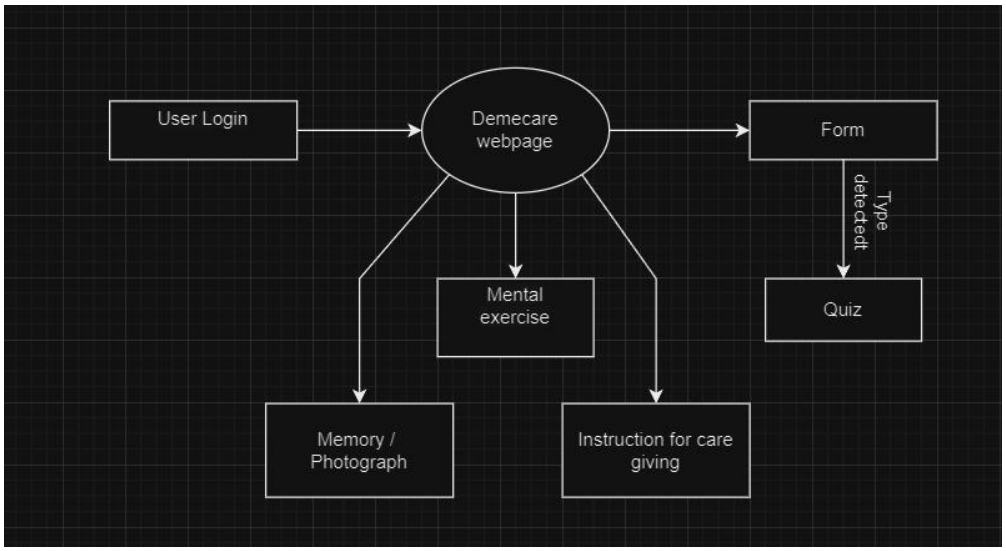

Figure 4.2: Data Flow Daigram

CHAPTER 5
RESULTS AND DISCUSSIONS

5.1 Implementation

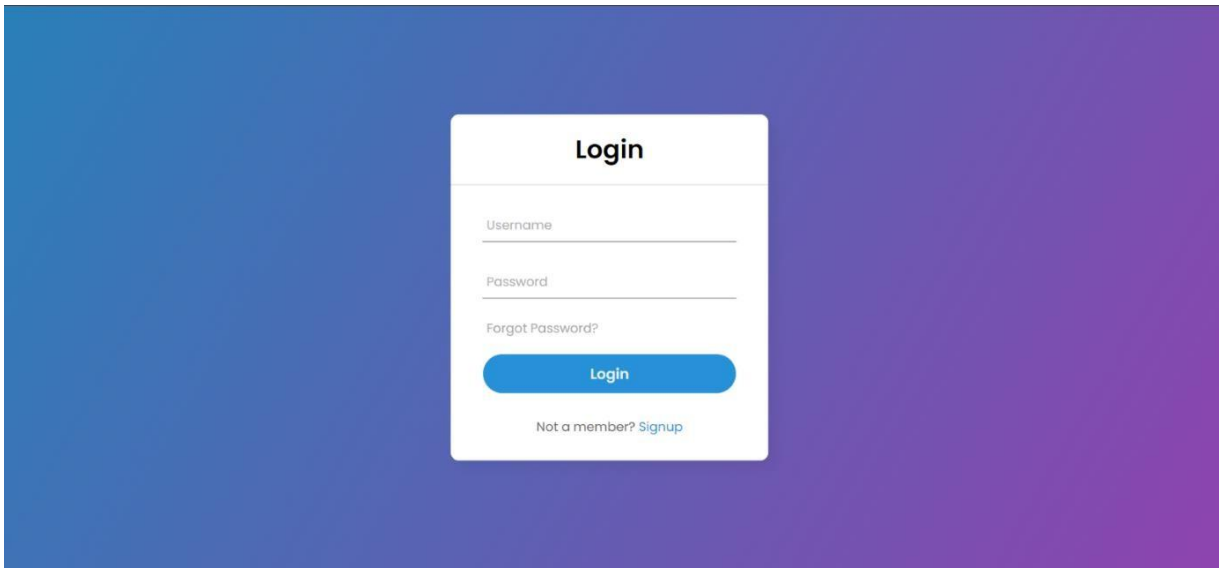

Figure 5.1: Login page
Fig 5.1 shows the Login Page of website

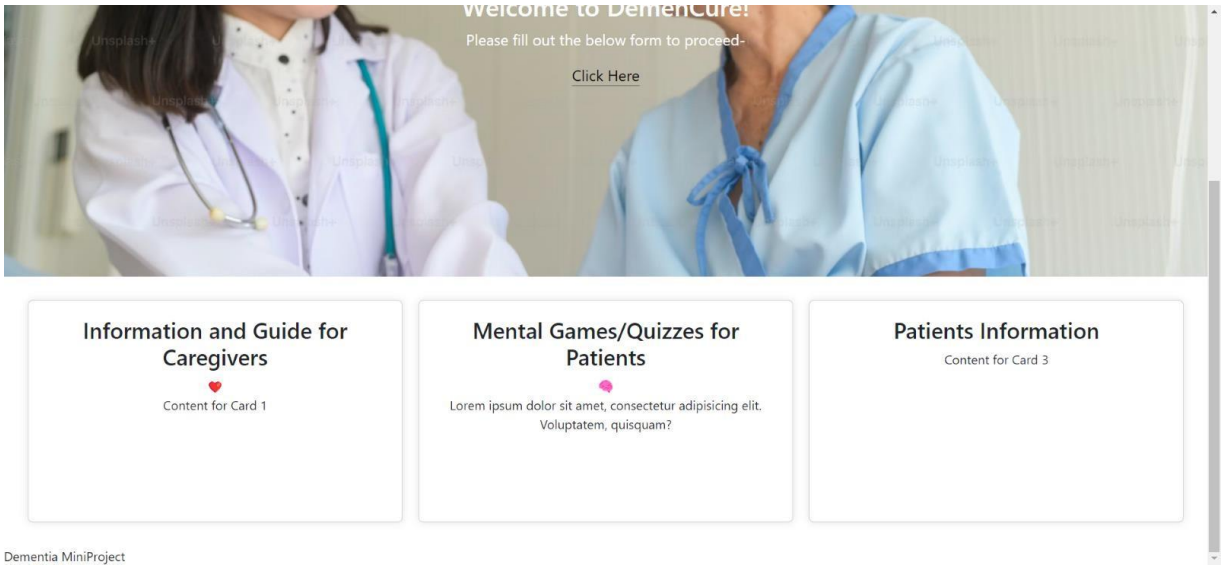

Figure 5.2: Home Page
Fig 5.2 shows the Home Page of website

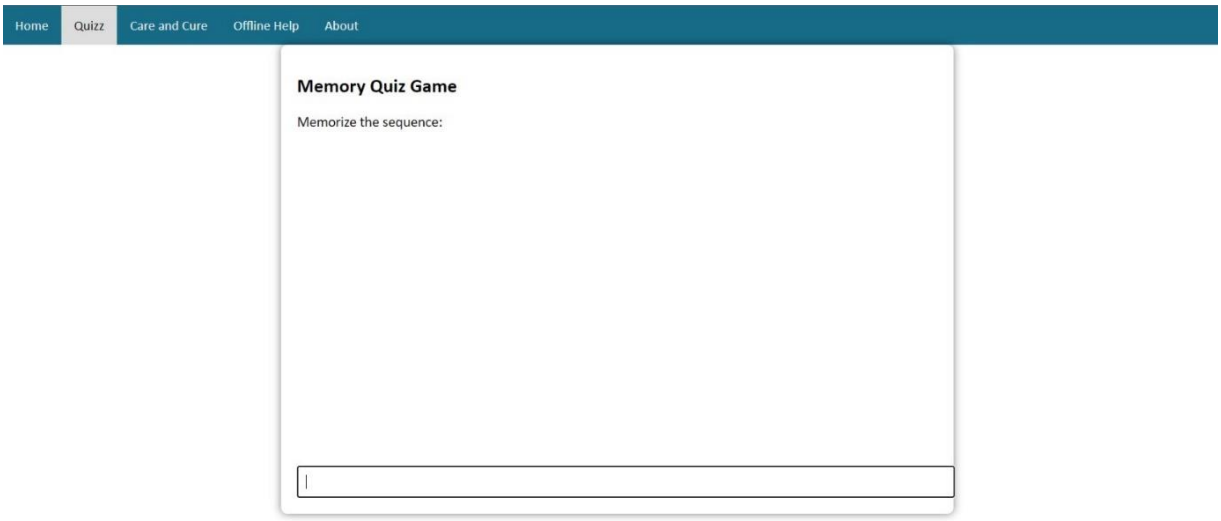

Figure 5.3: Game

Fig 5.3 shows the game made for dementia patients

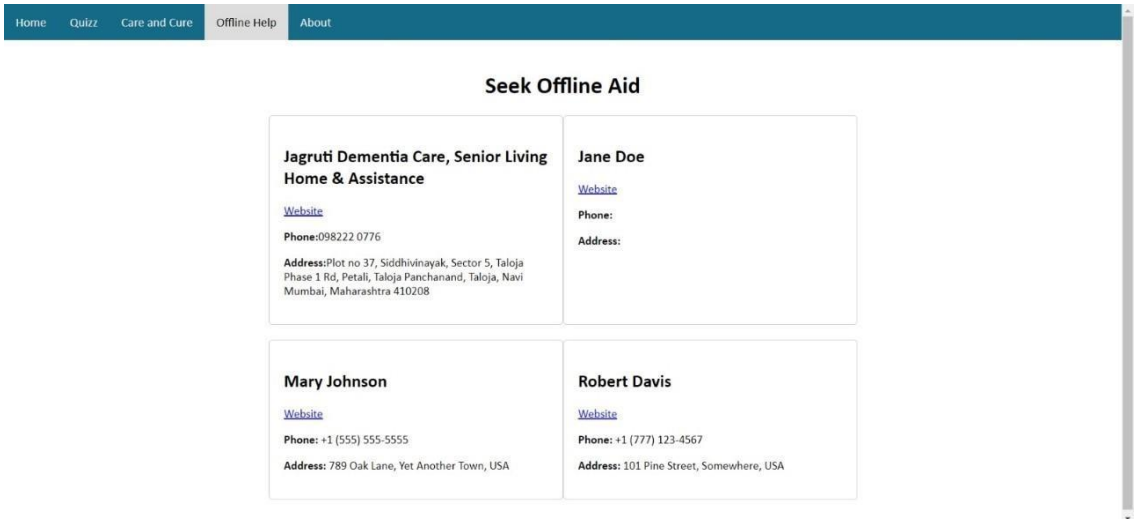

Figure 5.4: Offline Aid

Fig 5.4 shows the information of hospitals for Dementia Patients

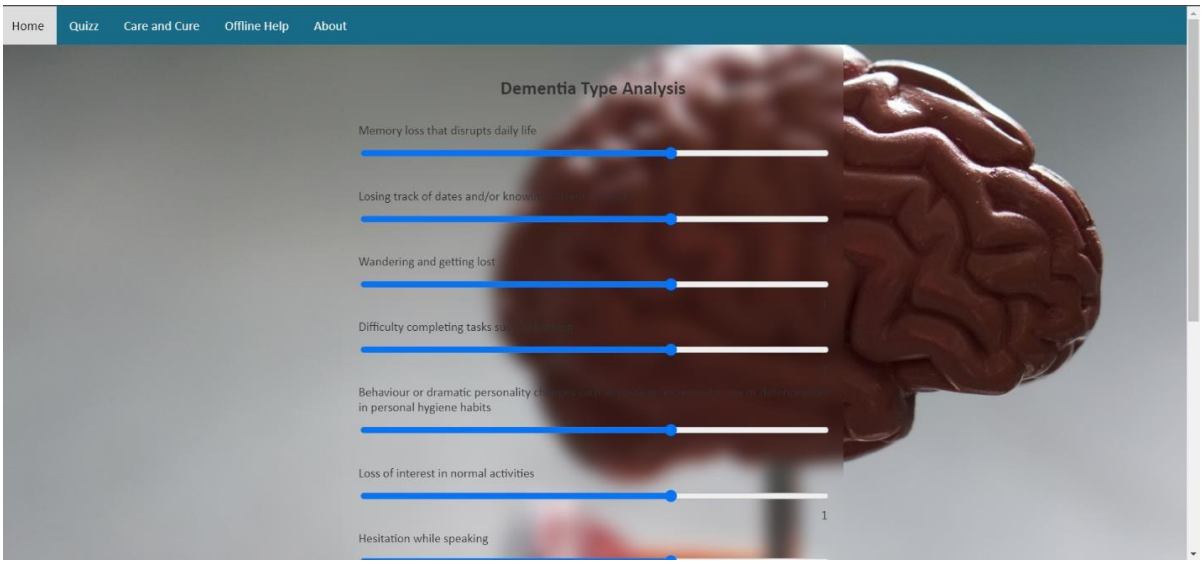

Figure 5.5: Type Detection Analysis

Fig 5.5 shows the how the analysis is done using symptoms

CHAPTER 6
CONCLUSION

Navigating the complexities of dementia requires understanding, empathy, and support. Our project has aimed to offer valuable insights, practical guidance, and resources for those affected by dementia, whether directly or indirectly. Remember, you are not alone in this journey. Seek the assistance of healthcare professionals, caregivers, and support groups. Embrace each moment, cherish the memories, and adapt to the changes. Together, we can foster a more dementia-inclusive and compassionate world. Let's continue to learn, support, and advocate for individuals living with dementia, empowering them to live fulfilling and dignified lives.

The future scope of a dementia website holds significant potential for growth, enhancement, and broader impact. Here are some potential areas of development:

Technological Advancements: Embrace emerging technologies like artificial intelligence, virtual reality, and machine learning to develop innovative tools and applications. These can aid in early detection, personalized care, cognitive training, and support for both patients and caregivers.

Community and Social Support Expansion: Facilitate community engagement by creating forums, online support groups, and discussion boards. Encouraging interaction and shared experiences can provide a sense of belonging and emotional support for individuals affected by dementia and their caregivers.

Continuous Education and Resources: Offer updated and comprehensive resources, including articles, videos, and downloadable content on recent research, treatment options, caregiving tips, and legal/financial guidance. Keeping the information current and easily accessible will be crucial.

Mobile App Development: Develop a mobile application to provide on-the-go support, tips, reminders, and access to resources. These apps could include memory aids, medication trackers, appointment reminders, and communication tools for caregivers and patients.

REFERENCES

[1] Centers for Medicare & Medicaid Services (CMS), "Dementia Care Synthesis 1989-2020."[Online].Available:https://www.cms.gov/priorities/innovation/data-and-reports/2022/dementia-care-synthesis-1989-2020.

[2] National Center for Biotechnology Information (NCBI), "Dementia Care in the Time of COVID-19."[Online].Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7392084/.

[3] The Alzheimer's Project, "The Alzheimer's Project Report 2021." [Online]. Available: https://www.sdalzheimersproject.org/content/dam/alzheimers/reports/The%20Alzheimer's%20Project%20Report%202021.pdf.

[4] Australian Institute of Health and Welfare (AIHW), "Hospital Dementia Services Project Study: Dementia." [Online]. Available: https://www.aihw.gov.au/reports/aged-care/hospital-dementia-services-project-study-dementia/summary.

[5] Alzheimer's Association, "Alzheimer's Disease Facts and Figures." [Online]. Available: https://www.alz.org/media/documents/alzheimers-facts-and-figures.pdf.

[6] National Institute on Aging (NIA), "What Are the Signs of Alzheimer's Disease?" [Online]. Available: https://www.nia.nih.gov/health/what-are-signs-alzheimers-disease.

[7] Mayo Clinic, "Frontotemporal Dementia: Symptoms & Causes." [Online]. Available: https://www.mayoclinic.org/diseases-conditions/frontotemporal-dementia/symptoms-causes/syc-20354737.

[8] Mayo Clinic, "Lewy Body Dementia: Symptoms & Causes." [Online]. Available: https://www.mayoclinic.org/diseases-conditions/lewy-body-dementia/symptoms-causes/syc-20352025.

[9] Stanford Medicine Blog - Parkinson's Disease, "Exercise for Lewy Body Disorders - Webinar Notes." [Online]. Available:

https://parkinsonsblog.stanford.edu/2021/02/exercise-for-lewy-body-disorders-webinar-notes/.

[10] National Institute on Aging (NIA), "What Are Frontotemporal Disorders?" [Online]. Available: https://www.nia.nih.gov/health/what-are-frontotemporal-disorders.

[11] Alzheimer's Society (UK), "Physical Activity and Exercise for Early to Middle Dementia." [Online]. Available: https://www.alzheimers.org.uk/get-support/daily-living/exercise/early-middle-dementia.