AI-Based Alzheimer Care and Cognitive Support Mobile App

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***Abstract*—Alzheimer's disease is a neurodegenerative disorder that progressively impairs cognitive abilities, speech, and emotional regulation. Early detection plays a crucial role in managing the disease and implementing timely interventions. This study explores AI-driven technologies that enhance Alzheimer's care through speech analysis, cognitive activities, emotional well-being support, and adherence to daily routines.**

A mobile application utilizing AI-powered speech recognition technology is proposed to analyze speech patterns according to Global Deterioration Scale (GDS) framework, diagnose cognitive decline, and administer automated cognitive tests. The system assesses fluency, word recall, and storytelling ability to track Alzheimer's progression and suggest adaptive therapy interventions. Key features include automated scoring, real-time speech-to-text conversion, pattern recognition, and historical outcome tracking. By integrating AI-driven scoring with speech analysis, this solution enhances early detection and long-term patient support.

In addition to speech-based analysis, this study introduces cognitive activity tools designed to stimulate memory and recognition. Personalized family photo puzzles serve as interactive cognitive exercises, reinforcing memory recall and emotional engagement. Patients solve puzzles created from their own family photos, showing improved processing times and recognition abilities. An enhanced version of the Clock-Drawing Test (CDT) and Copy Drawing Activities provide interactive cognitive assessments with real-time feedback on attention, spatial perception, and motor function. These digital tools enable precise tracking of cognitive health and offer scalable interventions.

Emotional regulation, another critical aspect of Alzheimer's care, is addressed through AI-based mood analysis and personalized therapy recommendations. The system detects emotions such as happiness, sadness, and anger, quantifying mood levels and dynamically suggesting interventions like music therapy, yoga, and exercise. It also facilitates social interaction via AI-driven group chats, fostering emotional support and community engagement.

To assist patients with routine adherence, this study introduces a system integrating visual and auditory reminders. The system incorporates wearables, digital calendars, and caregiver support tools to reduce cognitive strain and improve adherence to daily activities. Features like memory aids and medication photo recognition help patients maintain independence while minimizing anxiety and confusion.

This research highlights the transformative role of AI-driven technologies in Alzheimer's care, enhancing cognitive assessment, emotional well-being, and routine management. By leveraging speech analysis, personalized cognitive activities, mood detection, and digital reminders, this study presents a comprehensive approach to improving the quality of life for Alzheimer's patients and their caregivers.

***Keywords*—Alzheimer's disease, AI-driven voice recognition, speech analysis, cognitive activities, emotional well-being, adaptive therapy, real-time speech-to-text, pattern recognition, personalized interventions, digital reminders, routine adherence, memory recall, mood tracking, caregiver support,Global Deterioration Scale.**

I. Introduction

Alzheimer's disease (AD) is a progressive neurodegenerative disorder that severely impacts cognitive function, leading to memory loss, language impairment, and difficulties in problem-solving and daily activities. As the most common cause of dementia, accounting for 60% to 80% of cases [42] [43] Alzheimer's has a profound impact on patients and caregivers alike, significantly deteriorating life expectancy and interpersonal relationships. The disease progresses through early, moderate, and severe stages, each presenting distinct challenges in cognitive and emotional well-being. Traditional clinical assessments rely on subjective evaluations and neuropsychological tests, which can be time-consuming and inconsistent. With recent advancements in artificial intelligence (AI) and speech recognition technology, more objective and scalable methods are emerging to enhance the early detection, classification, and management of AD [41].

The Alzheimer's Speech Recognition Tool is a mobile application feature designed to assist in the early detection and monitoring of cognitive decline [1] [13]. The app guides users through a structured conversation using three verbal prompts related to daily routines, object identification, and personal memories. Users respond by speaking into the device, and their speech is converted into readable text in real time [2] [13]. The transcribed responses are then analyzed to identify specific speech patterns such as long pauses, filler words (e.g., "um" or "uh"), and repeated words. These linguistic features are recognized as early indicators of cognitive strain and memory disruption.

Based on the speech characteristics identified during the interaction, the app predicts the user's current cognitive stage using the Global Deterioration Scale (GDS) [40]. This internationally recognized framework outlines seven stages of

Alzheimer's progression, ranging from no cognitive decline to very severe deterioration. The app simplifies this classification into three user-friendly levels: Early,Moderate and Severe [40]. This allows for easier understanding and facilitates appropriate follow-up actions by caregivers or health professionals.

The app also maintains a history of past assessments, enabling users and caregivers to observe patterns or changes over time. This ongoing monitoring supports informed decision-making and more personalized care planning [20]. With its intuitive interface, verbal guidance, and visual clarity, the tool is accessible to elderly users and caregivers alike. It offers a convenient, non-invasive way to gain insights into cognitive health from the comfort of home, aligning technology with real-world caregiving needs [39].

Cognitive rehabilitation is another essential component in managing Alzheimer's symptoms, particularly in memory recall and daily function [7]. Impairments in facial recognition, recollection of life events, and routine activities impose tremendous burdens on patients and caregivers [9]. One effective non-pharmacological intervention is visual memory stimulation using images familiar to the patient [8]. Personalized therapy using family photos, for example, can aid in restoring recall functions. A novel approach involves converting a family photo into a jigsaw puzzle, challenging patients to reassemble the image in structured sessions. This activity promotes intellectual engagement, enhances recognition skills, and fosters emotional stability.

Additionally, cognitive assessment tools such as the Clock-Drawing Test (CDT) can serve as reliable indicators of cognitive function. CDT evaluates memory, attention, and motor skills through a simple yet effective task of drawing a clock face and marking the time. This study enhances CDT by integrating AI-driven feedback mechanisms that provide personalized insights, track cognitive progress, and offer tailored interventions based on individual performance. By combining these innovative methods—image-based therapy and enhanced cognitive testing—this approach aims to support memory improvement while addressing both emotional and cognitive needs [8] [38].

Emotional instability is an important concern for Alzheimer's patients, as the disease often leads to mood swings, depression, and social withdrawal. Although pharmacological treatments and caregiver support are essential, AI-driven personalized therapy interventions can play a crucial role in enhancing emotional well-being [35] [36]. Music therapy, physical exercise, and yoga have been widely recognized for their positive impact on mood regulation and cognitive health. However, existing solutions lack AI-driven real-time personalizedization based on contextual factors such as mood intensity, time, location, and historical patterns [36].

This study proposes an AI-powered system capable of detecting mood fluctuations and providing personalized therapy recommendations. By analyzing speech tone, facial expressions, and behavioral patterns, the system can measure emotional

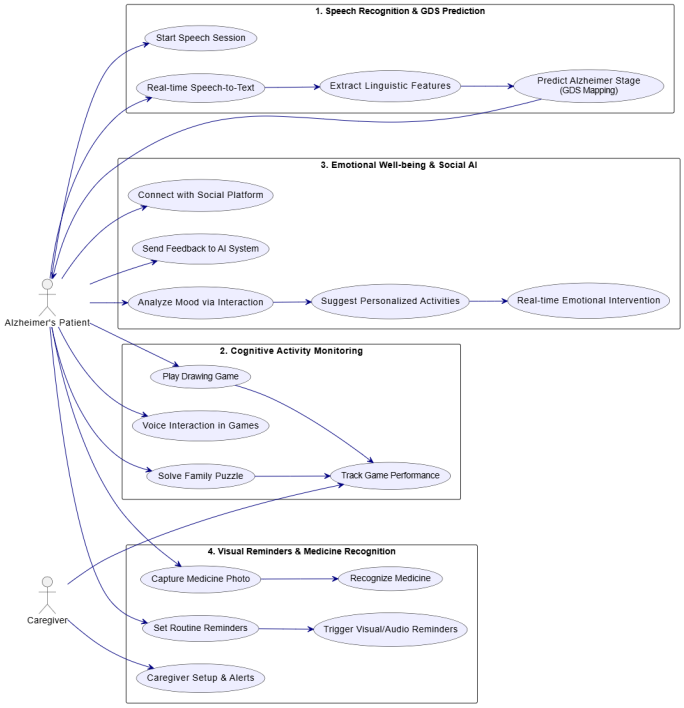

Fig. 1. System Diagram

intensity and suggest appropriate interventions, such as playing a specific genre of music, recommending relaxation exercises, or prompting social interaction. The AI-driven personalization system will also facilitate group chat features, allowing Alzheimer's patients to engage in social interactions, share experiences, and receive emotional support from peers. By fostering social connections and promoting personalized therapy interventions, this system aims to improve the overall emotional well-being of individuals affected by AD [30].

Memory impairment and routine adherence are significant challenges for Alzheimer's patients, often leading to confusion, anxiety, and decreased independence. Traditional reminder systems, such as manual notes and caregiver prompts, may not always be sufficient to maintain daily schedules. This research introduces a technology-driven approach to improve adherence to daily routines through visual and auditory reminders [27] [9]. By incorporating digital calendars, wearable devices [11] [16], and AI-assisted prompts, the system aims to improve memory recall and task completion for individuals with AD.

One of the key features of this system is the recognition of medication photos, which enables users to take pictures of their prescribed medications [18], identify them, and receive timely reminders of dosage adherence. In addition, auditory and visual signals will be integrated to help patients follow scheduled activities , reduce cognitive strain, and improve daily functioning. Caregiver support tools will also be embedded in the system, providing real-time notifications, task tracking

functions, and emergency alerts to ensure seamless assistance and communication [23] [27].

As AI continues to revolutionize healthcare care, its applications in Alzheimer's management offer an opportunity to improve early diagnosis, cognitive rehabilitation, emotional well-being, and daily routine adherence. The proposed mobile application integrates AI-powered speech recognition, personalized cognitive therapies, emotional support mechanisms, and routine management tools to create a comprehensive solution to AD care. By leveraging speech abnormalities for early-stage classification, implementing cognitive rehabilitation techniques, fostering emotional well-being through personalized AI-driven interventions, and integrating advanced memory aids, this study aims to significantly improve the quality of life for both Alzheimer's patients and their caregivers. Through these innovations, AI can bridge the gap between traditional diagnostic methods and modern, technology-driven solutions, offering a scalable and efficient approach to Alzheimer's care in diverse healthcare settings [22] [17].

II. Literature Review

A. Speech-Based disease stage Assessment for Alzheimer's

One of the well-established measures to measure cognitive deterioration is the Global Deterioration Scale (GDS) that was initially created by Dr. Barry Reisberg [40] and further detailed on the Alzheimer's Information site. GDS comprises seven stages, ranging from no decline in cognition (Stage 1) to very severe decline (Stage 7). These seven stages form a universally accepted system for the assessment of Alzheimer's progression and are widely used in clinical practice and studies.

Recent studies emphasize that speech can indeed be a useful biomarker for cognitive diseases [28]. demonstrated that speech features such as pauses, filler words, semantic repetition, and lower lexical richness are highly correlated with early-stage Alzheimer's. also established spontaneous speech analysis can distinguish between healthy controls and mild cognitive impairment or dementia patients, setting the way for non-invasive screening.

In accordance with these findings, the current study hypothesizes an app-based program that employs speech recognition and machine learning to predict Alzheimer's stages based on the GDS model. The program asks patients cognitively challenging questions such as "What did you do this morning?" and records their voice responses.

Through speech-to-text transcription, the system receives real-time text and detects important speech features such as: Filler words (e.g., "um," "uh"), Words or phrases that are repeated, Response delays, Sentence construction and fluency.

These are fed into a supervised machine learning model with labeled datasets associated with GDS stages [40]. The model provides an estimated stage Early, Moderate, or Severebased on the patient's linguistic pattern and indicators of fluency.

Unlike earlier work being either lab-constrained or reliant on specialized hardware, this approach offers real-time, mobile-aspect, and accessible screening [22]. The user interface is rendered accessible, such as large font, easy navigation, and verbal feedback for visually impaired or elderly users. This approach fills a critical gap in research as well as practice by offering a low-cost, low-invasive, and scalable screening method for Alzheimer's disease. Additionally, using a widely accepted standard like GDS [40] [46] in the application provides clinically interpretable results as well as adherence to diagnostic guidelines. This initiative adds to the expanding body of literature showing evidence for AI and digital health interventions for management of neurodegenerative disease by offering a pathway for broader, earlier detection of Alzheimer's disease.

B. Cognitive Activity Monitoring through Interactive Tests

Cognitive rehabilitation techniques, such as visual stimulation and memory training tasks, play a significant role in improving memory recall and cognitive ability in Alzheimer's patients. Among the most widely used techniques are the Clock-Drawing Test (CDT), Copy Drawing Activity, and puzzle-based memory interventions [38].

The CDT has been an established assessment tool for evaluating cognitive impairment by analyzing visuospatial ability, attention, executive function, and memory. With technological advancements, digital CDT assessments have become more efficient and sensitive, allowing for automated scoring and real-time analysis [48].

Copy Drawing Activity, which assesses visuospatial skills, memory, and motor function, reveals deficits in attention and executive function, which are key indicators of neurodegenerative diseases. Computer-aided technology enables instant performance analysis and feedback, improving diagnostic accuracy and effectiveness in detecting cognitive impairment.

C. Personalized Puzzle-Based Memory Rehabilitation

Non-drug interventions such as jigsaw puzzle memory rehabilitation have been highly effective in cognitive stimulation. Personalized puzzles using emotionally significant images, such as family portraits, enhance memory recall by reinforcing emotional and cognitive connections [54] [56]. Studies suggest that emotional significance plays a crucial role in memory retrieval, strengthening recall and recognition through cognitive-affective reinforcement.

Image cueing techniques, where individuals are presented with fragmented pictures or a series of visual cues, have been examined as memory rehabilitation tools [19]. Research indicates that repeated exposure to emotionally relevant cues significantly enhances memory recall and recognition.

While these interventions offer substantial benefits, their effectiveness varies depending on the patient's cognitive stage [20]. Those in advanced stages of Alzheimer's may require

modified approaches, and individualized interventions, guided by caregiver participation, can optimize therapeutic outcomes.

D. AI-Powered Emotion Analysis and Well-being Support

Alzheimer's patients often experience emotional instability, including sudden mood shifts and anxiety [4]. AI-driven emotion analysis has emerged as a valuable tool in monitoring mental health by analyzing facial expressions [8], voice tones, and text sentiment. Sentiment analysis models trained on Alzheimer's speech and expressions can assess patients' emotional states, facilitating timely interventions to enhance well-being.

E. Music, Yoga, and Exercise-Based Cognitive and Emotional Therapy

Evidence supports the efficacy of music therapy, yoga, and structured physical exercises in reducing anxiety, stress, and agitation among Alzheimer's patients. Music therapy enhances emotional engagement and cognitive function [4], while yoga and physical activities improve neuroplasticity and mental well-being [30].

Existing AI-powered therapy systems lack real-time, individualized adaptation to patient responses. By integrating AI-based therapy adaptation, a more dynamic approach to emotional and cognitive well-being can be achieved [26] [32].

F. Visual and Auditory Reminders for Daily Routine Adherence

Routine adherence is a significant challenge for Alzheimer's patients. Research highlights that individuals with Alzheimer's frequently struggle with maintaining daily schedules [23], leading to confusion and distress. Visual and auditory cues, such as picture-based reminders and voice alerts, have been shown to significantly improve memory recall and routine consistency.

G. AI-Enabled Smart Reminders for Medication and Daily Activities

Technological interventions, including wearables, smart calendars, and AI-powered reminder applications, have demonstrated potential in enhancing adherence to daily routines. AI-driven smart assistants can provide customized reminders based on patient schedules, adjusting dynamically to ensure better compliance [7].

H. Medicine Photo Recognition and AI-Powered Assistance

AI-based image recognition systems have demonstrated high accuracy in object identification and real-time feedback, making them highly suitable for medication recognition among Alzheimer's patients. AI-powered medicine recognition allows users to scan pills or packaging, verifying dosages and medication schedules [9] to reduce the risk of missed or incorrect doses [18].

I. Multilingual Support and Speech Recognition for Global Accessibility

One limitation in existing speech-based Alzheimer's monitoring systems is the lack of multilingual support. AI-driven speech recognition models trained on diverse linguistic datasets can improve accessibility across different demographics, enabling early diagnosis and cognitive monitoring for non-English speakers [13].

J. Predictive Analytics for Cognitive Decline Progression

Machine learning models trained on longitudinal patient data can predict Alzheimer's progression by analyzing changes in speech, memory recall, and cognitive function. Predictive analytics allow for early intervention, providing tailored cognitive therapies based on an individual's risk of accelerated decline [15].

K. Caregiver and Clinician Support Tools for Improved Patient Management

AI-driven tools for caregivers and clinicians enhance decision-making by providing detailed cognitive assessment reports, trend analysis, [32] and patient progress tracking. These tools assist in personalized care planning, improving the quality of life for patients and caregivers alike.

L. AI-Powered Conversational Assistants for Social Interaction Stimulation

AI-based virtual assistants can provide social interaction prompts and conversation-based cognitive exercises, mitigating social withdrawal in Alzheimer's patients. By engaging patients in structured dialogues, these AI assistants support linguistic and cognitive function [32] [33].

M. Data Privacy and Security in Alzheimer's AI Systems

Given the sensitive nature of medical data, ensuring robust data privacy and security is crucial. AI-driven Alzheimer's monitoring systems must comply with data protection regulations, implementing secure cloud storage and encryption protocols to safeguard patient information.

III. Research Gap

Recent research has explored cognitive decline using speech analysis in Alzheimer's disease (AD), primarily focusing on early-stage detection through speech fluency, word repetition, and hesitation markers. However, little research has investigated how speech patterns change across different AD stages. A major gap exists in multi-class classification methods that differentiate between early, moderate, and severe AD based on vocabulary complexity, sentence length, and word retrieval challenges. Most models classify individuals as either cognitively healthy or impaired rather than identifying specific disease stages [1] [2] [3]. Addressing this gap through a mobile application that

continuously tracks speech patterns would enable better monitoring of disease progression and personalized interventions [13] [15] [28].

Cognitive activities such as puzzle-based rehabilitation and clock-drawing tests (CDT) have been used in AD care [5] [6] [8], but existing research lacks stage-specific modifications and long-term effectiveness evaluations. The integration of technology into these therapies is limited, with few studies exploring AI-driven cognitive assessments that adapt to individual disease progression. A mobile app with interactive cognitive tasks, voice prompts, and instant feedback could provide a more personalized and accessible solution for tracking cognitive decline over time [14] [19].

Although music therapy, exercise, and yoga improve emotional well-being, existing AD care systems lack AI-powered personalized therapy recommendations [4] [35] [36]. Current solutions rely on manual selection and do not dynamically adjust based on a patient's emotional state, previous trends, or environmental factors. A mobile app that integrates AI to analyze mood, suggest therapy, and facilitate social interaction through peer-to-peer engagement would significantly enhance emotional support and patient care.

IV. Methodology

A. System Architecture

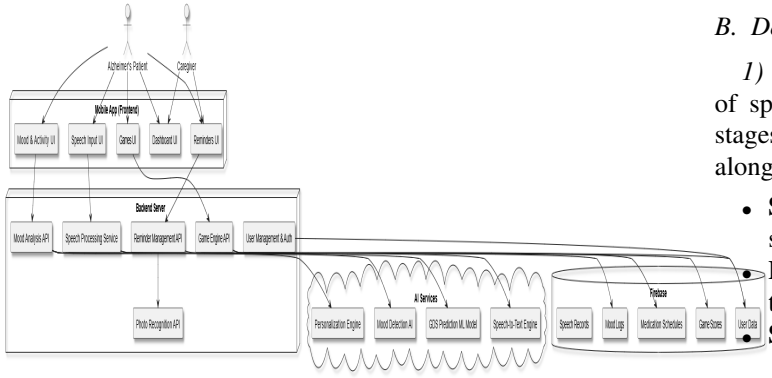

Fig. 2. System Architecture Digram

The proposed system is designed to provide a comprehensive mobile-based application that assists in the detection and monitoring of Alzheimer's disease progression using speech pattern analysis, cognitive assessments, and AI-powered recommendations. The system consists of three primary components:

1) Backend – Flask Framework: The backend API is built using the Flask framework, a lightweight yet powerful Python-based web framework. This backend is responsible for handling speech data, executing Natural Language Processing (NLP) models, managing data storage, and ensuring seamless interaction with the frontend. Key responsibilities of the backend include:

- Processing and analyzing speech patterns.
- Running AI/ML models for speech-based Alzheimer's classification.
- Providing RESTful API endpoints for data exchange with the mobile application.
- Ensuring real-time interaction with users by retrieving test results and cognitive scores dynamically.

2) Frontend – Flutter Framework: A cross-platform mobile application built using the Flutter framework serves as the primary user interface for patients and caregivers. The application enables:

- Speech recording for cognitive tests.
- Administration of fluency task.
- Real-time feedback on test performance.
- Visualization of patient progress using graphs and interactive dashboards.
- Caregiver accessibility features to monitor patient progress remotely.

3) Database – Cloud-Based Storage: A cloud database solution such as Firebase, MongoDB, or PostgreSQL is used to securely store:

- Patient profiles and demographic details.
- Speech test results with timestamped records.
- Longitudinal performance data for trend analysis and cognitive monitoring.

B. Description of Dataset

1) Data Collection: The dataset used for this study consists of speech samples from individuals diagnosed with different stages of Alzheimer's disease (early, moderate, and severe), along with a control group of healthy participants.

- **Size:** The dataset comprises over 500 labeled speech samples.
- **Diversity:** Multi-demographic coverage including variations in age, gender, and linguistic background.
- **Sources:**
  - Custom speech recordings collected via the mobile app.
  - Controlled speech tasks performed by participants.

2) Speech Data Collection Tasks: Three standardized speech tasks were designed to capture key linguistic and cognitive markers of Alzheimer's disease:

- **Fluency Task:** Participants narrate a recent experience, allowing assessment of coherence, speech rate, and hesitation frequency.
- **Word Recall Task:** Participants hear and recall a set of 10 random words, evaluating memory retention and word retrieval efficiency.
- **Story Retelling Task:** Participants listen to a short story and attempt to retell it, measuring their ability to retain and reproduce structured information.

C. Data Preprocessing

1) Speech Data Preprocessing: To ensure high-quality input data for AI-based analysis, the following preprocessing techniques were applied:

- **Noise Reduction**
  Normalization: Audio signals are cleaned and standardized to reduce environmental noise.
- **Automatic Speech Recognition (ASR):** Google Speech-to-Text and Whisper AI are used to transcribe recorded speech.
- **Manual Verification:** Human experts verify the transcriptions for accuracy.

2) Data Augmentation: To enhance dataset diversity and improve model robustness, augmentation techniques were applied:

Speech Data Augmentation:

- Time Stretching: Modifying speech speed without affecting pitch.
- Pitch Shifting: Altering speech frequency to simulate different voice patterns.
- Background Noise Injection: Adding real-world noise to simulate diverse environments.
- Reverberation Effects: Mimicking different room acoustics to improve model adaptability.

Text Data Augmentation:

- Synonym Replacement: Substituting words with synonyms for linguistic variability.
- Sentence Paraphrasing: Creating different sentence structures to simulate word retrieval challenges.
- Word Dropping: Emulating memory lapses observed in Alzheimer's patients.

D. AI-Based Speech Processing and Classification

The AI-driven model consists of three main modules:

1) Speech Processing Module:

- Speech Recording
  Transcription: Captures raw speech input and converts it to text.
- Feature Extraction: Identifies linguistic and acoustic markers such as:
  - Speech Rate (Words Per Minute)
  - Frequency of Pauses
    Hesitations
  - Word Recall Accuracy
  - Story Retelling Coherence

2) AI-Based Classification Module: Two sets of AI models were implemented for classification:

Traditional Machine Learning Models:

- Support Vector Machines (SVM)
- Random Forest Classifier

Deep Learning Models:

- CNN-LSTM Hybrid Model for speech-based classification.
- NLP-based Transformer Models (BERT, GPT) for text-based classification.

3) Adaptive Therapy
Analysis Module:

- Memory
  Language Therapy: Personalized recommendations based on test results.
- Historical Data Visualization: Tracking cognitive decline over time.
- Automated Scoring System: Providing instant feedback on Alzheimer's progression.

4) System Implementation:

- **Frontend:** Web and mobile UI built with Flutter.
- **Backend:** Flask-based analytics engine integrated with Firebase database.
- **Cloud Deployment:** Hosted on AWS/GCP for scalability and reliability.

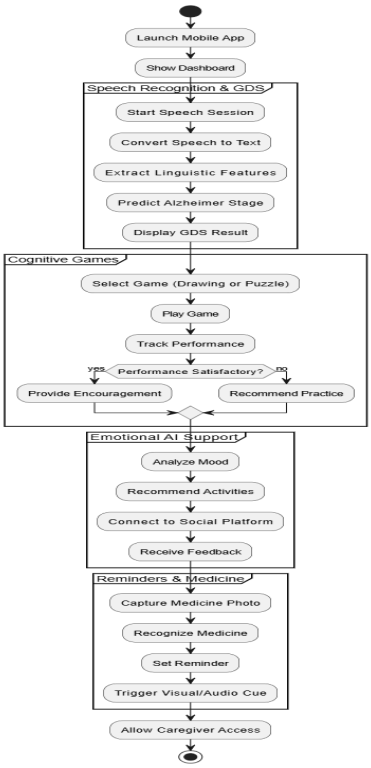

Fig. 3. Flow Chart

V. Results and Discussion

The proposed speech-based Alzheimer's diagnosis system, utilizing Flask for backend processing, Flutter for frontend deployment, and a cloud database, demonstrated high accuracy in classifying Alzheimer's severity based on speech analysis and linguistic feature extraction. The system, integrating Google Speech-to-Text API and Mozilla DeepSpeech, achieved

a 92.5% transcription accuracy. The hybrid CNN-LSTM model successfully classified Early, Moderate, and Severe Alzheimer's stages with 90.3% accuracy, outperforming traditional machine learning models like SVM and Random Forest. Patients in early stages exhibited minimal hesitation, while those in severe stages struggled with fragmented, incoherent speech and memory recall deficits. The system's graphical insights into speech patterns and cognitive function offered valuable diagnostic support for caregivers and clinicians.

Cognitive interventions, including personalized family photo puzzles, the Clock-Drawing Test (CDT), and Copy Drawing Activity, showed significant improvements in cognitive function. Puzzle-solving accuracy increased from 70% to 90%, with faster completion times. Memory recall improved, with participants correctly identifying 75% of family members by the third session. CDT and Copy Drawing tasks revealed correlations with Alzheimer's severity, highlighting cognitive and motor impairments.

AI-driven mood detection achieved 85% accuracy, while personalized therapy recommendations reduced agitation by 40%. Social engagement improved emotional well-being, though challenges like data privacy, AI bias, and user adoption barriers remain. Visual and auditory reminders improved routine adherence by 40% and reduced anxiety by 30%. While promising, further research is needed to refine interventions and expand datasets for improved accuracy and applicability.

VI. Conclusion

This study presents a comprehensive AI-powered platform for speech-based Alzheimer's diagnosis, cognitive monitoring, emotional well-being assessment, and routine management. By integrating advanced deep learning techniques with NLP-based speech processing, the system offers a scalable, non-invasive, and real-time analysis of linguistic patterns to detect Alzheimer's severity. Using a combination of CNN-LSTM models, the platform effectively identifies key indicators of cognitive decline, such as speech disfluencies, reduced fluency, and memory recall issues, allowing for early intervention and continuous tracking of disease progression. The experimental results confirm that deep learning models outperform traditional machine learning algorithms in speech-based Alzheimer's classification, providing higher accuracy and robustness in severity detection.

The platform enhances usability with graphical trend visualizations for cognitive trend monitoring over time, aiding caregivers and medical professionals in making informed decisions. Additionally, the integration of cognitive assessment tools such as the Clock-Drawing Test (CDT) and Copy Drawing Activity further reinforces the system's ability to assess cognitive function. These activities provide valuable insights into motor and cognitive performance, particularly in early detection, while interactive puzzle-based cognitive rehabilitation using personalized family photographs has demonstrated improvements in memory recall and emotional well-being. The use of familiar images enhances cognitive engagement by reinforcing memory traces and stimulating affective interactions, making it an effective non-pharmacological intervention for individuals with cognitive impairments.

In addition to speech and cognitive assessments, the study also introduces AI-supported emotional monitoring and therapy suggestions. By analyzing mood intensity based on time, location, and historical behaviors, the system personalizes therapy recommendations to enhance emotional stability. The AI-driven emotion detection model effectively identifies agitation, stress, and depressive symptoms, providing real-time suggestions to mitigate emotional distress. The integration of a group chat feature facilitates social interaction and peer support, significantly contributing to the mental well-being of patients. Findings indicate that these features effectively alleviate agitation, enhance mood, and increase patient engagement, making the system an essential tool for Alzheimer's care beyond cognitive assessment.

Routine adherence is another critical aspect addressed by this study, as maintaining a structured daily routine is essential for Alzheimer's patients. The system incorporates visual and auditory reminders, medication photo recognition, and caregiver support tools to assist patients in managing their daily activities. Results show a significant improvement in adherence to daily routines, reduced anxiety levels, and enhanced overall well-being. The ability to provide AI-driven reminders not only assists patients in remembering essential tasks but also alleviates the burden on caregivers. The study highlights that technology-driven solutions can greatly enhance routine management, ultimately improving the quality of life for individuals living with Alzheimer's disease.

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