

Chain-of-Thought Prompting for Alzheimer’s Classification in Multimodal LLMs

Assignee Research

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Abstract

Societies worldwide are rapidly entering a super-aged era, making elderly health a pressing concern. The aging population is increasing the burden on national economies and households. Dementia cases are rising significantly with this demographic shift. Recent research using voice-based models and large language models (LLM) offers new possibilities for dementia diagnosis and treatment. Our Chain-of-Thought (CoT) reasoning method combines speech and language models. The process starts with automatic speech recognition to convert speech to text. We add a linear layer to an LLM for Alzheimer’s d

1 Introduction

This paper examines: Reasoning-Based Approach with Chain-of-Thought for Alzheimer’s Detection Using Speech and Large Language Models. Research question: To what extent does chain-of-thought prompting improve the reasoning accuracy of multimodal LLMs on three-stage Alzheimer’s classification tasks relative to standard zero-shot inference?.

2 Methodology

Systematic literature search across multiple databases yielded 16 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 6.4/10.

3 Results

16 papers retrieved. 5 claims extracted; 5 independently verified. Quality review score: 6.4/10.

4 Limitations

This report is a machine-generated literature synthesis and does not constitute original research. Automated retrieval and verification may introduce errors or omissions. Review scores reflect automated assessment, not human peer review. Readers should consult primary sources for authoritative information.

5 Extracted Claims

Claim	Verified	Confidence
The proposed method achieved an 16.7% relative performance improvement compared to methods without CoT prompt reasoning.	✓	0.30
The proposed method achieved state-of-the-art performance in CoT approaches.	✓	0.25
Studies consistently note significant underdiagnosis in primary care, exacerbated by inadequate clinician training and c	✓	0.25
Speech analysis has emerged as a promising non-invasive tool for early detection of AD due to its strong correlation wit	✓	0.26
Individuals with AD exhibit slower speech rates, longer pauses.	✓	0.22

References

- <http://arxiv.org/abs/2506.01683v1>
- <http://arxiv.org/abs/2509.21662v1>
- <http://arxiv.org/abs/2311.17076v3>