

# Affordable Conversational AI For Global Dementia Screening P-343

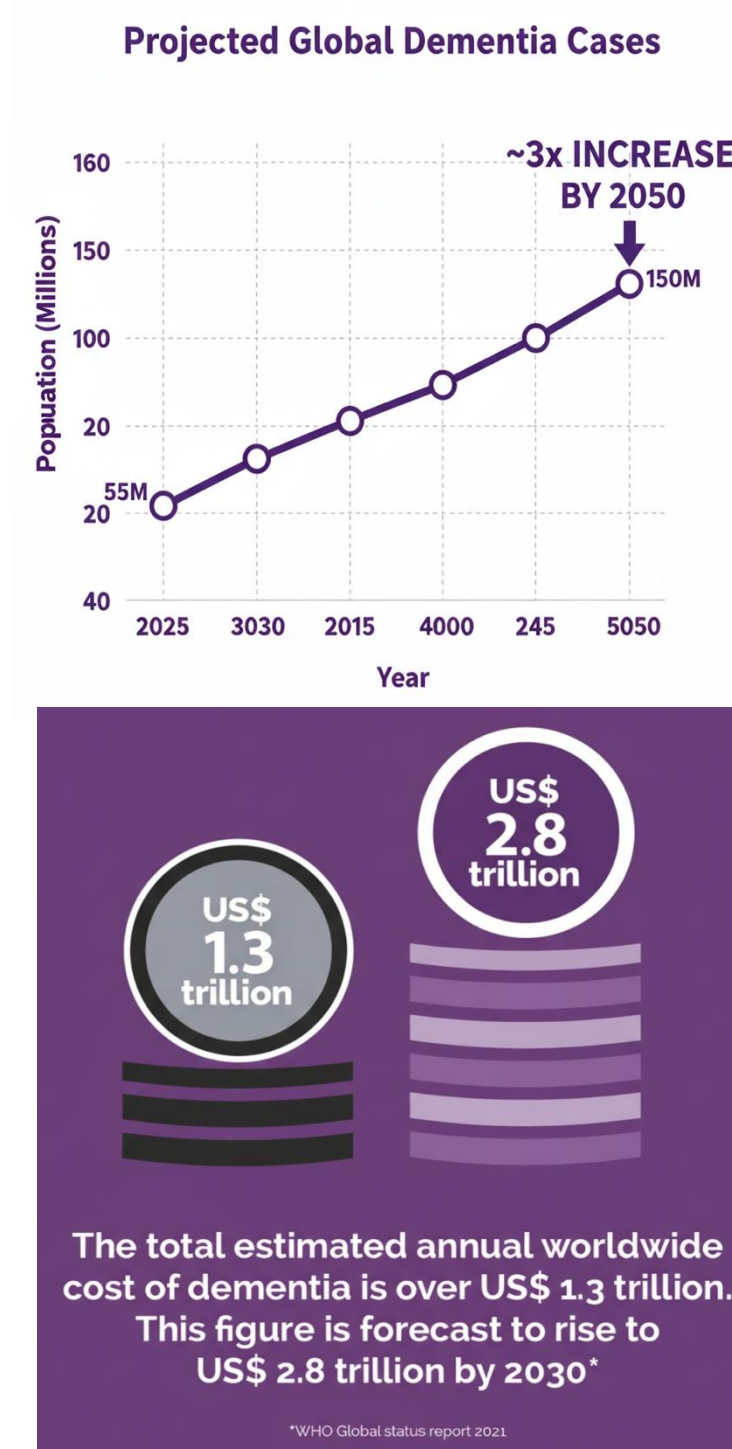
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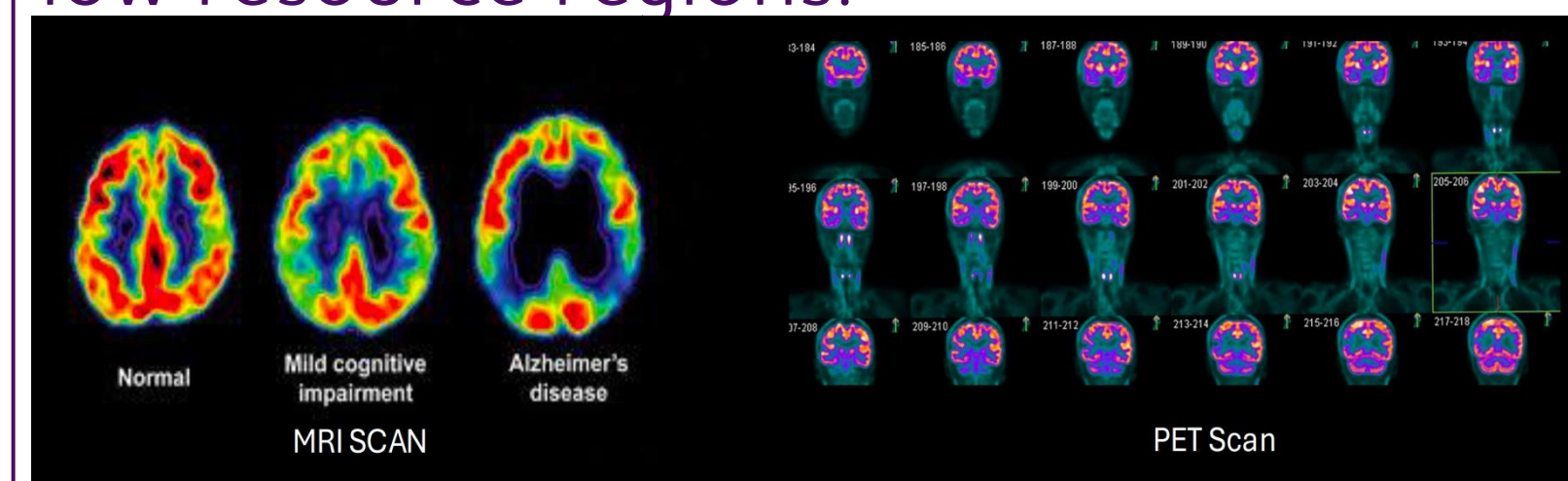
Low-cost Conversational AI for early dementia detection. Transformer models capture syntax and semantics of cognitive decline. Unify multilingual datasets. Works across multiple languages and tasks. Achieves 87% accuracy. Supports Binary classification DM vs HC. Effective even for low-resource languages. Cross-lingual generalization. Provides scalable, accessible global screening.

## INTRODUCTION

Dementia (DM) affects over 55 million people globally, with one new case emerging every three seconds. The annual global cost of dementia is now above US\$ 1.3 trillion and is expected to rise to US\$ 2.8 trillion by 2030.



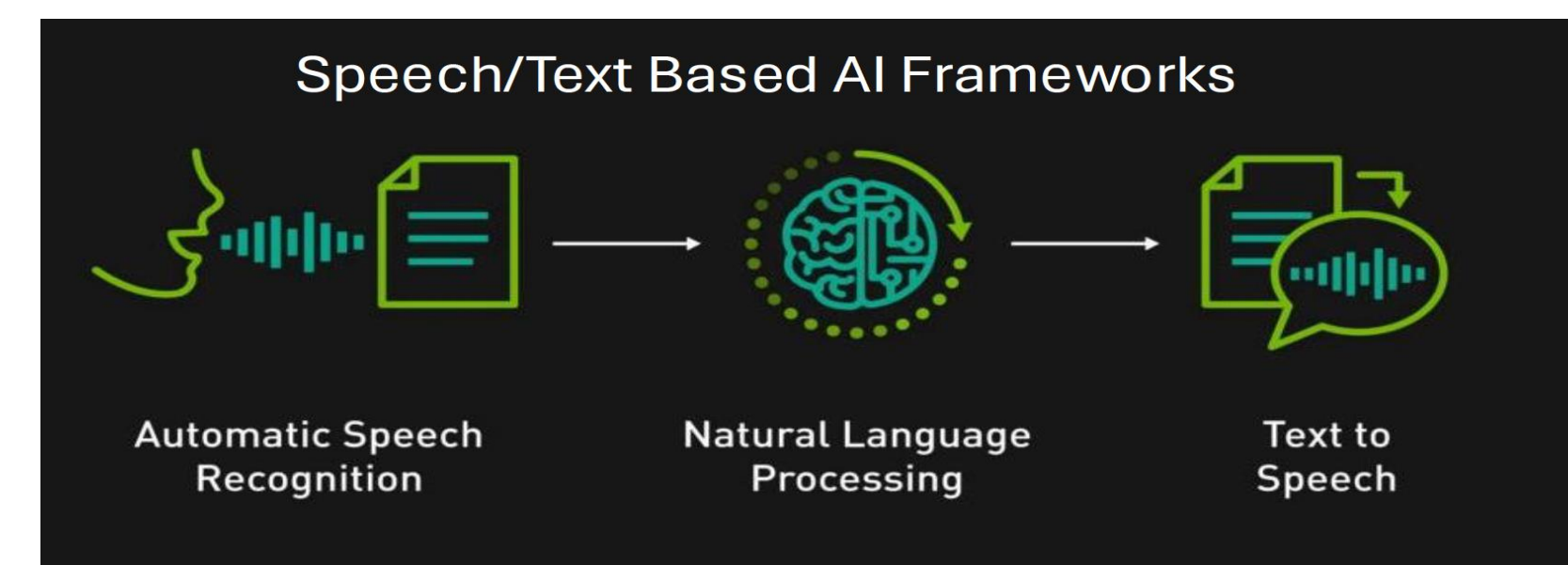
As a progressive neurocognitive disorder, DM impairs memory, language, and reasoning. Early detection is vital for intervention, yet conventional methods such as MRI and PET scans remain costly and inaccessible in many low resource regions.



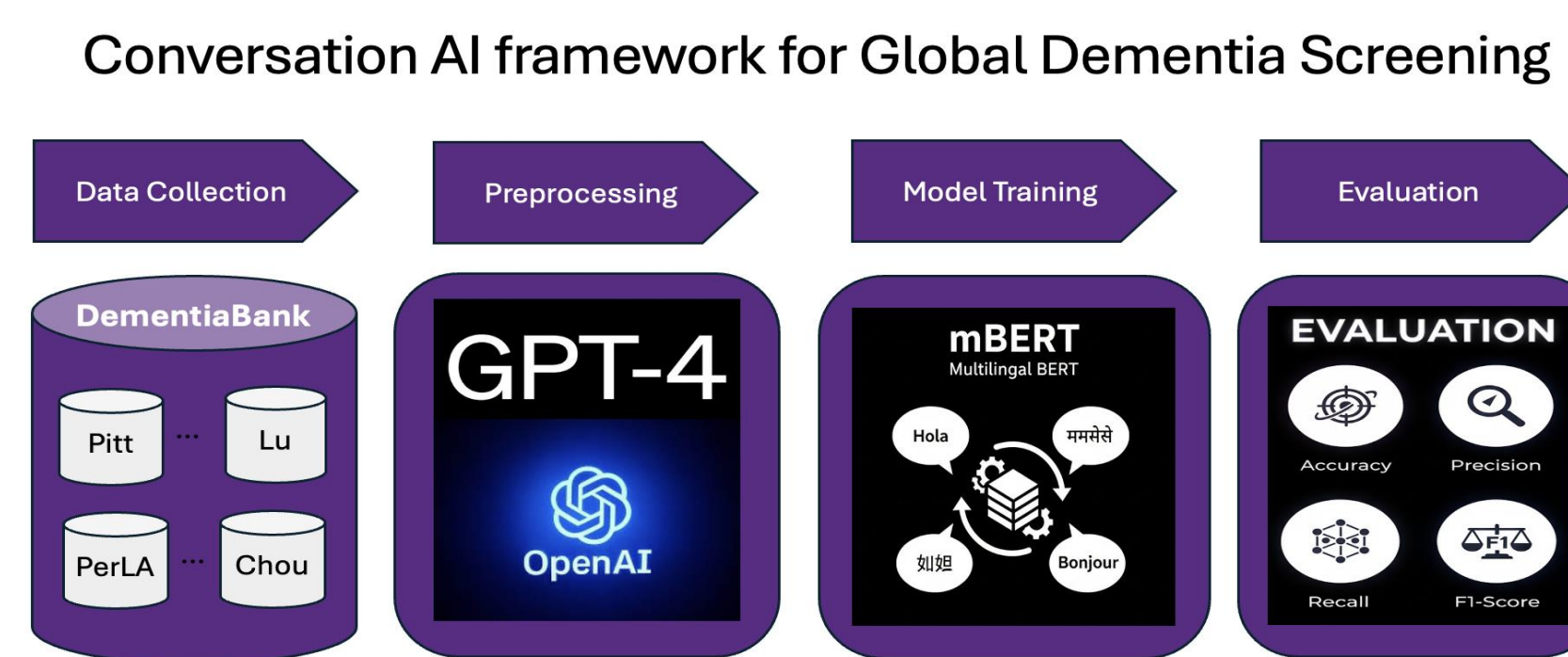
Recent advances in conversational AI provide a promising, non-invasive alternative by identifying language-based cognitive biomarkers.

## METHODS

We introduce a unified Conversational AI framework for low-cost Dementia detection



The system uses an LLM model for preprocessing and labeling conversational transcripts, and a transformer-based encoder for cross-lingual representation learning of semantic and syntactic biomarkers.



Our method unifies Dementia-related datasets from DementiaBank across multiple languages, covering tasks such as Picture Description, Fluency Task, and Story Retelling. Finally, a binary classifier is used on these multilingual embeddings to determine whether a participant belongs to the Dementia (DM) or Healthy Control (HC) group.

## RESULTS

We used Stratified Random Sampling with 80/20 Train and Test Split for diagnostic categories (DM, HC) across languages

Language	Train Split		Test Split	
	DM	HC	DM	HC
English	1044	1258	261	315
Spanish	81	157	20	39
Mandarin	0	96	0	24
<b>Total</b>	<b>1125</b>	<b>1510</b>	<b>281</b>	<b>378</b>

Our cross-lingual experiments confirm that our method maintains high predictive performance even when tested on untrained and low resource languages, indicating robust detection of shared linguistic biomarkers such as lexical reduction, syntactic simplification, and semantic drift. Our cross-lingual experiments confirm that our method maintains high predictive performance even when tested on untrained and low resource languages, indicating robust detection of shared linguistic biomarkers such as lexical reduction, syntactic simplification, and semantic drift.

Language	Accuracy	Precision	Recall	F1-score
English	0.87	0.83	0.83	0.81
Spanish	0.77	0.71	0.73	0.70
Mandarin	0.81	0.81	0.82	0.80
<b>Average</b>	<b>0.82</b>	<b>0.78</b>	<b>0.79</b>	<b>0.77</b>

## CONCLUSIONS

By using the latest multilingual AI models, our approach provides a scalable, accessible, and cost-effective alternative to conventional clinical screening.

Future work will extend to multi-classification and multi-modal features to deploy it as a real-time conversational screening tool for global cognitive health monitoring.

## REFERENCES

- Ding, Kewen, et al, "Speech based detection of Alzheimer's disease: a survey of AI techniques, datasets and challenges," Artificial Intelligence Review,, 2024.
- DementiaBank: talkbank.org/dementia
- Chennareddy, Srihith, and Charisse N. Winston. "Foundation AI Models for Reliable MRI-Based Dementia Detection." In 2025 2nd International Conference on Intelligent Systems for Cybersecurity (ISCS), pp. 1-5. IEEE, 2025. DOI: 10.1109/ISCS69371.2025.11385905

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