

# Analysing Dialogue to Support Detection of Alzheimer's Disease

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## **[Introduction/Motivation:]**

As well as memory loss and linguistic impairment, changes in behaviour and decreased interactional skills in conversation are also symptoms for Alzheimer's Disease (AD). Recent work has shown that **linguistic** features can be used within natural language processing (NLP) and machine learning (ML) methods to provide computational tools with potential for automatic detection of AD [1]; however, few studies have applied these techniques to investigate the predictive power of **interactional** symptoms. Automatic diagnosis of AD aids assessment and allows for earlier diagnosis. Interactional features are linguistically and culturally independent, allowing the automation to be applied across languages and borders.

## **[Methods:]**

We investigate the use of interactional features (IFs) to predict AD, and compare performance against and in addition to known predictive linguistic (but non-interactional) features (Non-IFs) [1]. IFs investigated are chosen to encode known symptoms of AD observable in conversation transcripts, such as turn-taking, filler term frequency and trailing-off mid-sentence. Following [1], we examine the task of discriminating patients with dementia from controls in the DementiaBank Pitt corpus [2]; we assess the overall utility of features via classification accuracy using logistic regression. Non-IFs & IFs were compared by ranking the features based on ANOVA F-value, and we use correlation analysis on the IFs as a sense check and to investigate the direction in which each variable correlates with the diagnosis.

## **[Results and Discussion:]**

Initial results suggest that interactional features (IFs) can assist in computationally classifying AD. IFs are amongst the top features in terms of predictive power. Feature combinations including IFs can improve accuracy by nearly 5% over the state of the art [1]. Features encoding turn-taking and clarification behaviour between speakers are amongst the most predictive.

## **References:**

- [1] K.C. Fraser, J.A. Meltzer and F. Rudzicz. Linguistic features identify Alzheimer's disease in narrative speech.. *Journal of Alzheimers Disease*, 49(2):407–22, 2016.
- [2] J.T. Becker, F. Boller, O.L. Lopez, J. Saxton and K.L. McGonigle. The natural history of Alzheimer's disease: description of study cohort and accuracy of diagnosis. *Archives of Neurology*, 51(6):585-594, 1994.