A NEURAL MODEL FOR PREDICTING DEMENTIA FROM LANGUAGE

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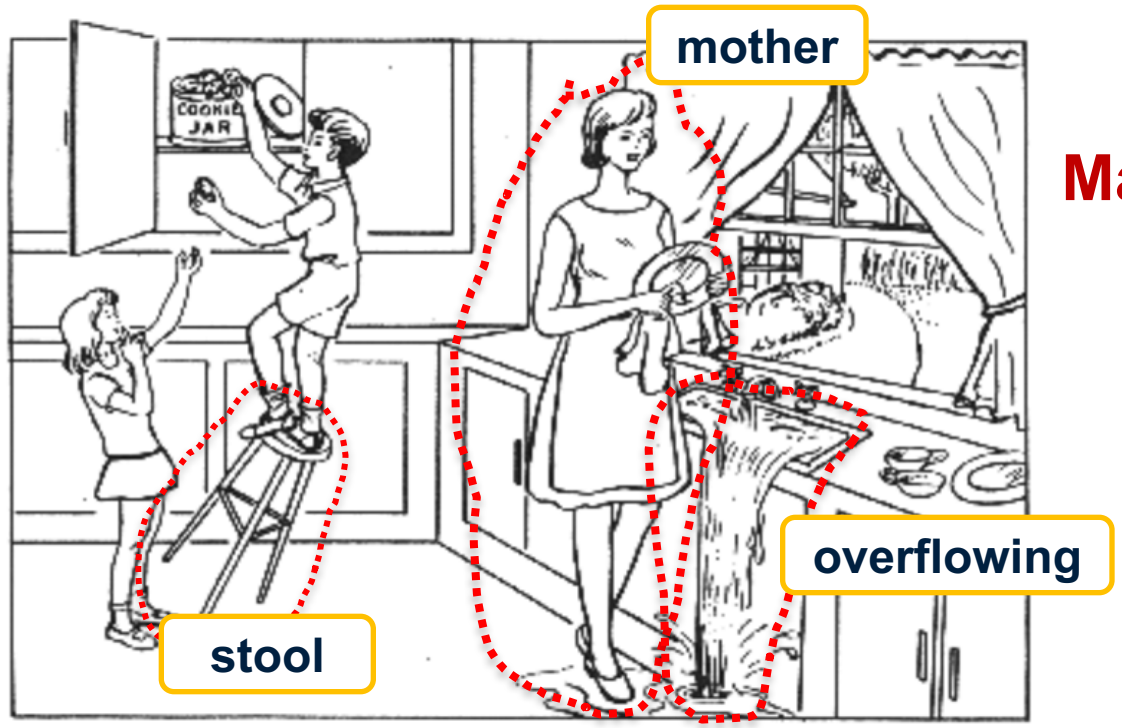
DEMENTIA PREDICTION VIA SPEECH ANALYSIS

- Diagnosis of dementia
  - Cognitive performance on standardized tests
  - Resource-intensive specialized tests
  - Expensive, time-consuming and invasive
- **Language** is one of the first facilities afflicted by the disease.
  - Subtle changes in language are observed a year or more before dementia is diagnosed (Kempler, 1995).

ML and NLP based approaches for automated dementia prediction. Non-invasive, inexpensive and easy to administer

DATASET

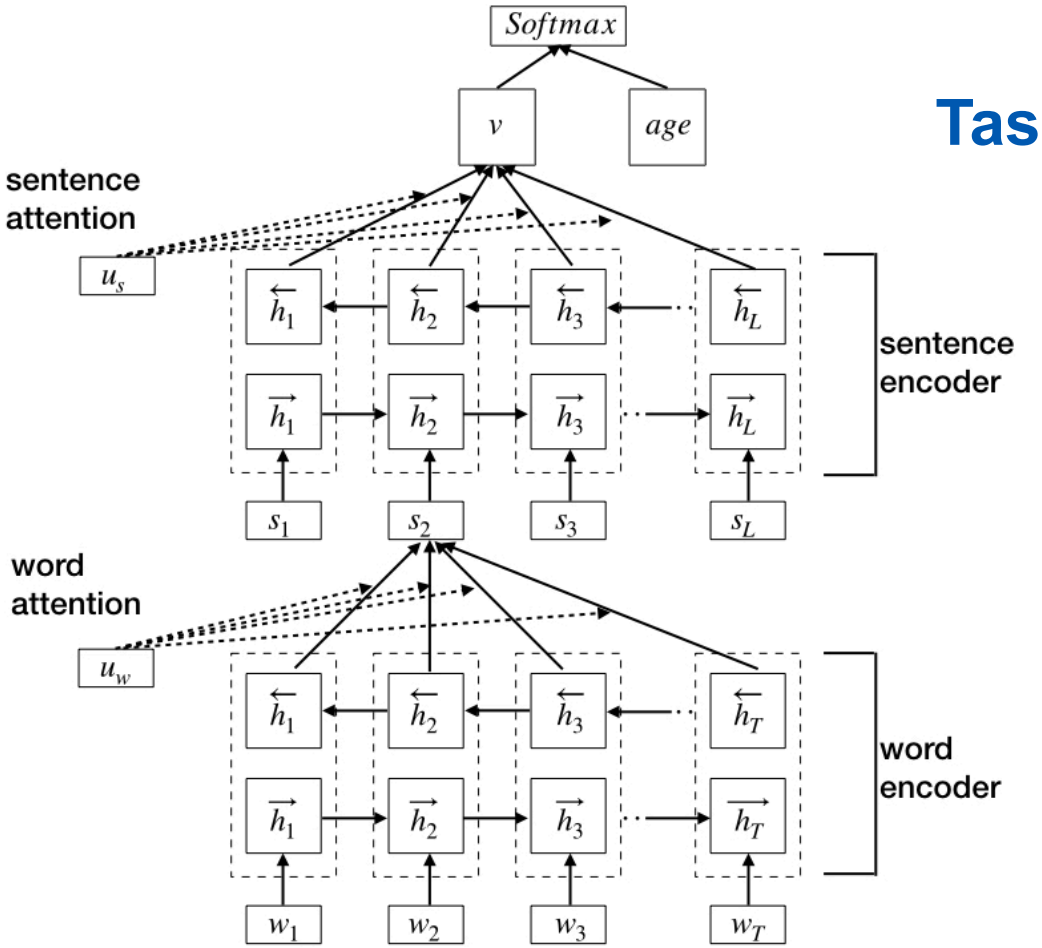
- **DementiaBank**
  - Audio recordings and manual transcripts
  - 257 Alzheimer's disease (AD) vs. 242 elderly healthy control.
  - **Information units** capture key concepts in the picture



Manually defined!
Task specific!

HIERARCHICAL ATTENTION NETWORKS (HAN)

- An end-to-end neural text classification model (Yang et al., 2016)



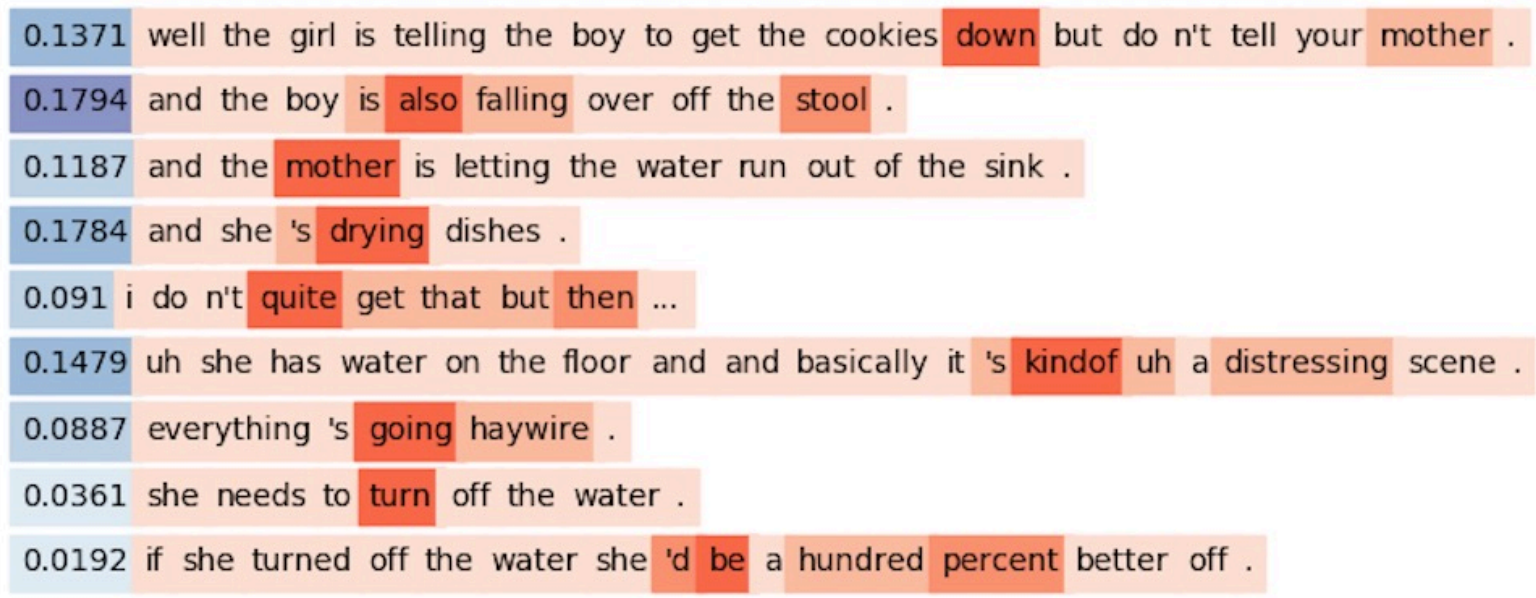
Task agnostic

RESULT SUMMARY

- **Age** is important!
- Without age (HAN)
  - Comparable to the performance of the best traditional model using task-specific features
- With age (HAN-AGE)
  - State-of-the-art performance
  - Large boost over the top-performer traditional method which also uses age

NEURAL ATTENTION ANALYSIS

- Attention mechanism
  - allows HAN to learn important sentences/words for prediction



capture key concepts similar to info units

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Thank you!

SELECTED REFERENCES

- Daniel Kempler. Language changes in dementia of the alzheimer type. *Dementia and communication*, pages 98–114, 1995.
- Zichao Yang, Diyi Yang, Chris Dyer, Xiaodong He, Alex Smola, and Eduard Hovy. Hierarchical attention networks for document classification. In *Proceedings of the 2016 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies*, pages 1480–1489, 2016.