Manual and Automatic Transcriptions in Dementia Detection from Speech

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Motivation

- The population in Germany is ageing rapidly
- With age comes a higher risk for developing dementia
- Society needs fast and affordable means of detecting dementia

→ Automatically detect dementia from speech

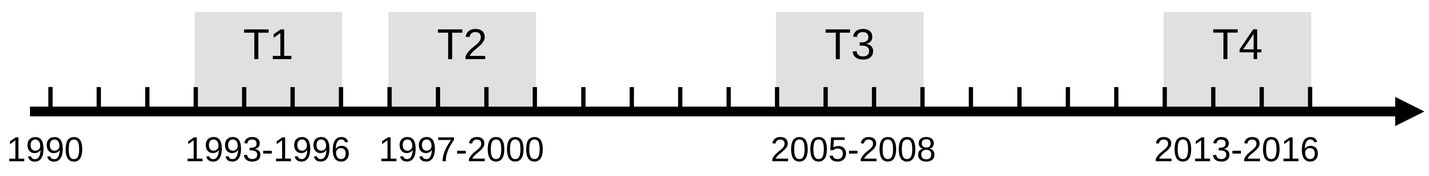
- We can detect dementia from speech using
  - Acoustic features
  - Linguistic features → Needs transcription
- Automatic detection relies on automatic transcriptions

→ Investigate how our dementia detection works with automatic transcriptions

Database: ILSE

- Biographic interviews
  - Several hours duration
- Cognitive diagnoses made by psychiatrists
- Three measurements
  - Over time some participants developed dementia
- Real world data set
  - Natural prevalence of dementia
- Selected data:
  - Cognitive diagnoses available
  - Transcription available

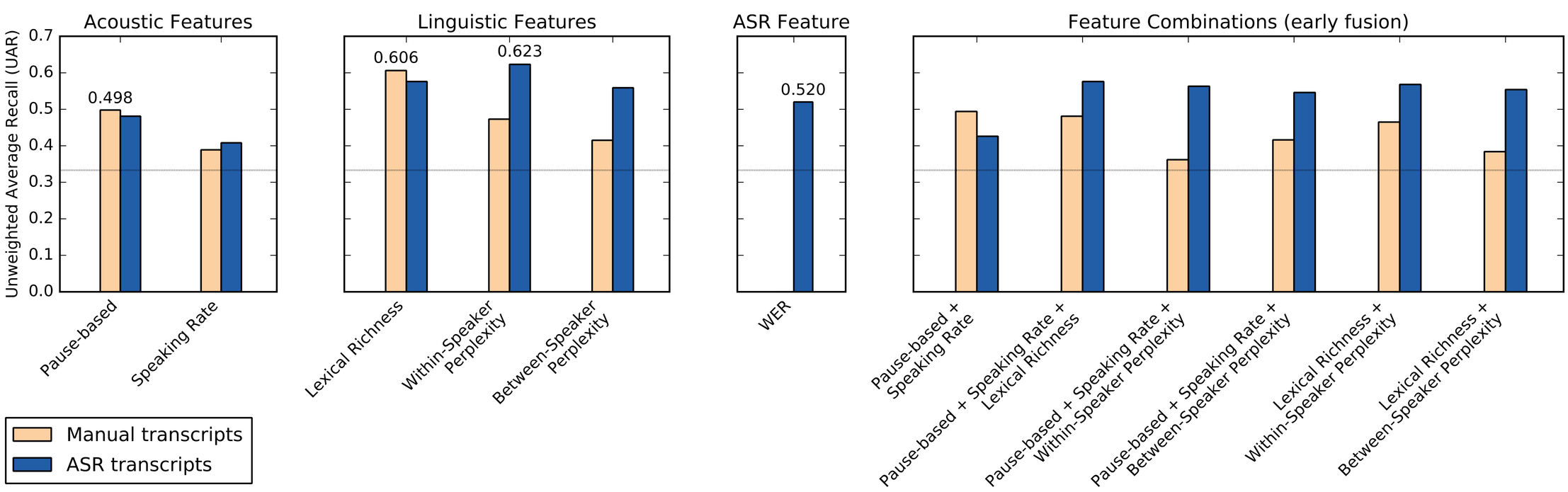
		Diagnoses		
		control	AACD	AD
Measurement	T1	51	4	-
	T2	19	8	-
	T3	10	1	5
Total		**80**	**13**	**5**



Dementia Detection

- Leave-one-person-out cross-validation
- Mutual information feature selection
- Gaussian classifier

- Compare features from manual and ASR transcriptions
- Metric: Unweighted Average Recall (UAR)



- We can detect dementia using ASR transcripts
  - No need for manual transcription
  - Features are robust against ASR errors
- Automatic versions of the features outperform their manual counterparts
- Word error rate itself is a strong feature

- Feature selection + feature-level fusion finds no better features
- Future work:
  Dementia detection using speaker diarization and automatic transcription

Automatic Speech Recognition System

- Trained on 256 hours of ILSE interviews
  - Acoustic Model: DNN, 6 hidden layers
  - Language Model: 3-gram KN (ppl 199.38)
  - Dictionary: Train vocab (oov 1.49 %)

Diagnosis	Overall WER	mean WER	std WER
control	56.0 %	58.2 %	14.9 %
AACD	60.4 %	60.8 %	12.1 %
AD	70.2 %	70.1 %	7.0 %
All	**58.5 %**	**59.2 %**	**14.4 %**

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