Recognizing Slips of the Tongue With Kaldi ASR

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Background

More insight into the speech errors made by people with neurodegenerative diseases could possibly help with early diagnosis of these conditions.

Objectives

This study aims to prove whether the Kaldi ASR toolkit could be used to recognise 2 speech errors: 1) \v\ → \p\ (five → fipe, seven → sepen) and 2) intended word → combination of intended word and closely related word (one → tw'one, five → fou'five, nine → eigh'nine).

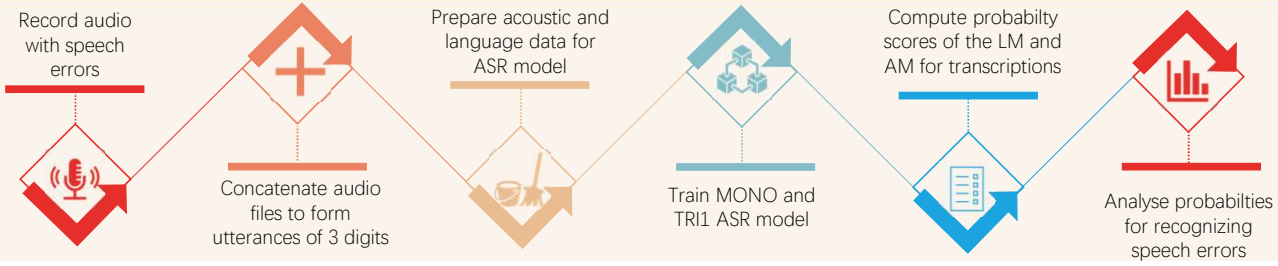
Materials

OS:	Ubuntu
ASR toolkit:	Kaldi
Language:	Python & Bash
Train audio data:	FSDD (Free Spoken Digit Dataset)
Test audio data:	2 male speakers (Dutch accent)

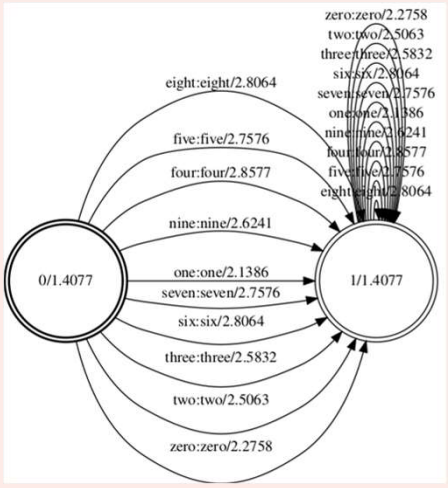
Hypothesis

The acoustic and language model probability scores for respectively the phone and word sequences can be used to determine speech errors in audio.

Methods



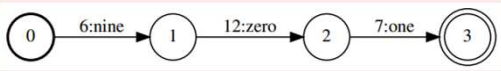
Results



The language model created from the lexicon and corpus.

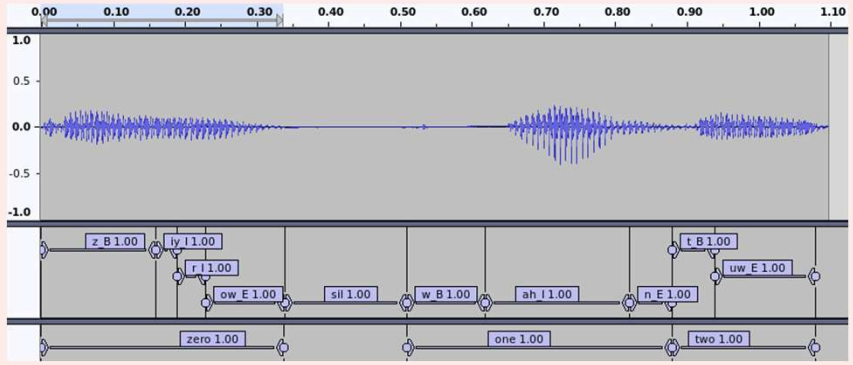
	CER	WER	SER
MONO	0.85	0.83	2.50
TRI1	0.85	0.83	2.50

Comparison of MONO and TRI1 Character Error Rate (CER), Word Error Rate (WER) and Sentence Error Rate (SER)



Lattice for the sentence 'nine zero one' which has only one path, The average number of paths found for each lattice is one.

Kaldi toolkit doesn't consider phone and word level probabilty scores of the AM and LM of importance and therefore retrieving these scores was deemed too big a task for the scope of this project.



Otherwise obtained phone and word level confidence scores along with their time aligned transcription. The sound wave is plotted along the time with on the y-axis the amplitude. Right underneath is the transcritpion of the phones found in the audio follwed by their confidence scores. Beneath the phone transcription is the word transcription follwed by their confidence scores.

Conclusion

For this dataset and model implementation, the confidence scores are not usable for determining speech errors, mainly due to the limited available data.