BembaSpeech: A Speech Recognition Corpus for the Bemba Language

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LREC 2022, 20-25 June

Abstract

. **BembaSpeech:** 24 hours of read speech
. An exploration of approaches for end-to-end Bemba ASR
. Multilingual 1 billion XLS-R model gives the best result of **32.91% WER.**

Motivation

- Need of a speech dataset for the Bemba language to build ASR systems.

Bemba Language

. **Bemba** (also referred to as **ChiBemba, Icibemba**) is a Bantu language principally spoken in Zambia by over **30%** of the population.
. It is a *written* but *low resourced language*.
. It has **5 vowels** and **19 consonants**
. Writing system: **Latin script**.

Description of BembaSpeech

. **24 hrs** read speech.
. **14, 438** utterances.
. **17 speakers**; **9** male & **8** females.
. Fixed splits: **train**, **dev** & **test** sets with **no speaker overlap**.
. Audio files encoded in ***.wav** format.
. Sample rate: **16kHz**.

Characteristics of the BembaSpeech ASR

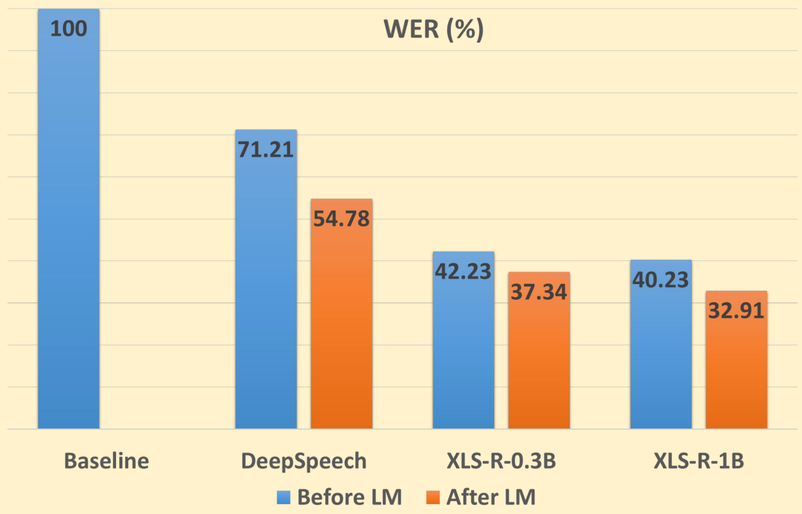
Subset	Size (Hrs)	# of Files	Speakers	Male	Female
Train	20	11906	8	5	3
Dev	2.5	1556	7	3	4
Test	2	977	2	1	1
Total	**24.5**	**14438**	**17**	**9**	**8**

Table 1: General characteristics of the BembaSpeech ASR dataset

Data Collection Methodology

. **Audio recording tool**: Lig-Aikuma Mobile App[1].
. **Text sources:** diverse publicly available sources/domains including; Bemba literature books and youtube video transcripts.
. **Preprocessed** the dataset to ensure data accuracy.
. **Availability**: publicly **available** under CC BY-NC-ND 4.0 license.

Experiments and Results



Experiments and Results

. **E2E model**: DeepSpeech (v0.8.2)
. Dataset size: **17 hrs** subset of dataset.
. **LM1**: Transcripts (train and dev sets)
. **LM2**: Transcripts + JW300
. **Baseline model** - training from scratch using DeepSpeech.
. **Monolingual pre-trained model**: *DeepSpeech English model*
. **Multilingual pre-trained model**: *Wav2vec2.0 based XLS-R* [*300 million* and *1 billion* parameter models]
. The **1 billion XLS-R model** achieves the best result of **32.91% WER**

Future work

. Carry out in-depth error analysis
. Try the Transformer based language model
. Investigate unusual results
. Expand the size of the corpus

References

[1] Gauthier et al. (2016), **Lig-Aikuma: A Mobile App to Collect Parallel Speech for Under-Resourced Language Studies**, INTERSPEECH 2016