Pattern Recognition Lab

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Common Phone

A Multilingual Dataset for Robust Acoustic Modelling

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Introduction

Key features of Common Phone

Six Languages
English French German
Italian Russian Spanish

Many Speakers
More than 11.000 speakers
recorded 116 hours of speech

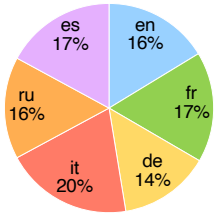
Phonetic Labels
101 different phonetic symbols
following IPA standards

Made for Robustness
Countless number of
microphones & environments

Material and Methods

Motivation

- Refined version of Common Voice[1]:
  - Eliminate imbalances
  - Enrich annotation
  - Preserve multilingual idea
- Provide reference dataset for:
  - Robust acoustic modelling
  - Testing in real-world environment



Speaker selection

- Only **logged-in** users were considered
- Gender-balanced distribution after 5-1-1 logic
- Age-balance: See Figure 1

Phonetic Labelling

- Automatic annotation with MAUS web-service[2]
- Pronunciation estimate as weighted output of G2P and ASR

Distribution

- Original MP3 files from CV
- Standard 16 kHz, 16 bits, single channel WAV
- Meta information for every speaker (age, gender, [dialect])
- Praat TextGrids with alignment information

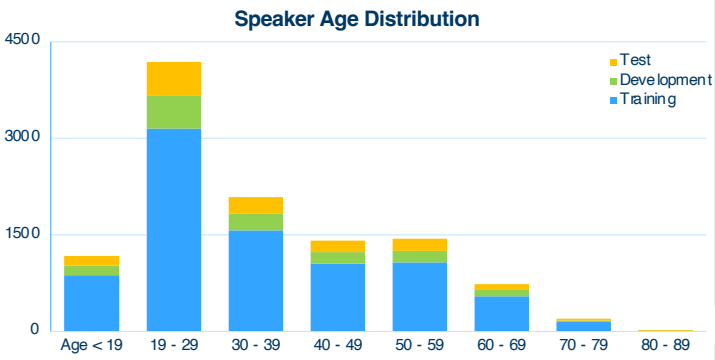


Figure 1: Age distribution of speakers in Common Phone.

Acoustic Modelling with CP

Training

- Fine-tuned Wav2Vec 2.0[3] base model (95 million parameters) with CP on 101 phonetic symbols
- Model was pre-trained on English speech only
- 3-step learning rate schedule:
  1. Warm-up (10 epochs)
  2. Plateau (30 epochs)
  3. Exponential decay (120 epochs)
- Optimization with Adam & CTC loss

Testing

- Decoding beam width: 10
- Phonetic symbol Error Rate (PER) as

$$\text{PER} = \frac{N_{del}+N_{ins}+N_{rep}}{N_{True}}$$

Language/	Dev	Test
English	15.5	15.6
French	18.8	18.4
German	19.4	19.4
Italian	17.8	17.4
Russian	20.0	21.4
Spanish	14.5	15.0
Total	17.8	18.1

Table 1: PER (in %) observed for the six different languages of CP.

Conclusion

Long story short

- Common Phone is a refined version of Mozilla's Common Voice corpus collected from thousands of speakers
- The provided training, development and test splits resemble a more balanced distribution of speakers with respect to age, gender or language
- Reliable results for phonetic symbol recognition with SOTA acoustic model

Who wants to use Common Phone

- All speech researchers who want to
  - train models that are robust enough for deployment
  - test their models against a broad environment of signals
  - have phonetic labels for training/testing
  - want to work with multilingual data

References

[1] Ardila et al. LREC. Common voice: A massively-multilingual speech corpus. 2020
[2] Kisler et al. CS&L. Multilingual processing of speech via web services. 2017
[3] Baevski et al. NEURIPS. wav2vec 2.0: A framework for self-supervised learning of speech representations. 2020

Get Common Phone

Common Phone is available online via zenodo.com
A pre-print of the paper is available on arxiv.org

Acknowledgements

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