A Semi-manual Annotation Approach for Large CAPT Speech Corpus

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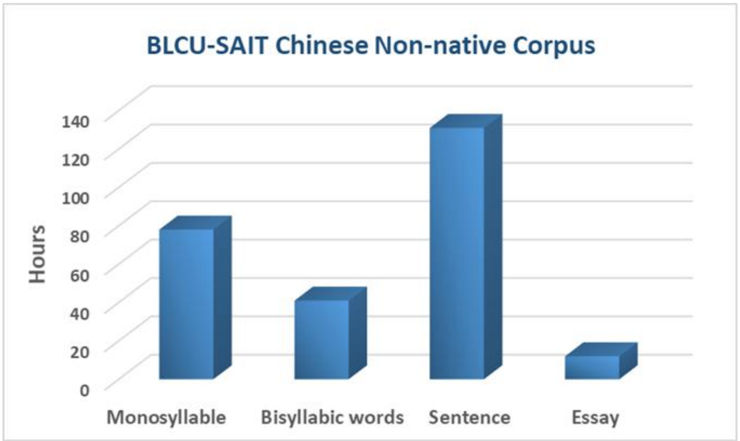
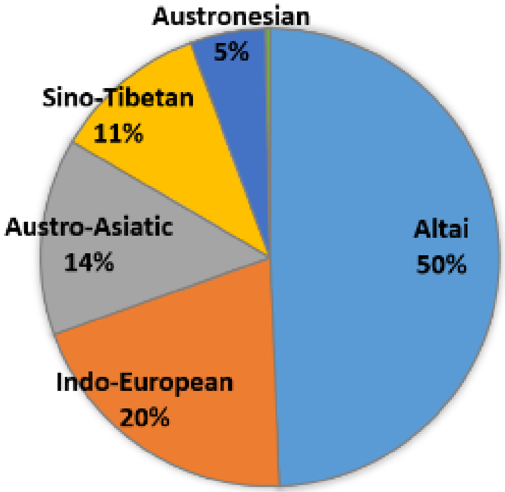
Outline

- □ BLCU-SAIT CAPT Speech Corpus
- □ Semi-manual Annotation Methods
- □ Annotation Evaluation Methods
- □ Annotation Results
- □ Conclusion

BLCU-SAIT CAPT Speech Corpus

- Aiming at Computer Assistant Pronunciation Teaching
- 243 hours’ nonnative data from 618 Speakers
- 21 kinds of native language backgrounds





BLCU-SAIT CAPT Speech Corpus

Sentence Set:

- 103 declarative sentences + 35 question/exclamatory sentences
- cover 97% tri-tone types bounded by prosodic boundary
- cover 96% syllable types

Word Set:

- 284 bi-syllable words
- cover 97% Chinese segmental phonemes
- cover 20 kinds of bi-tone types

Monosyllable Set:

- 1520 tonal syllables
- 98% base syllables

A Discourse:

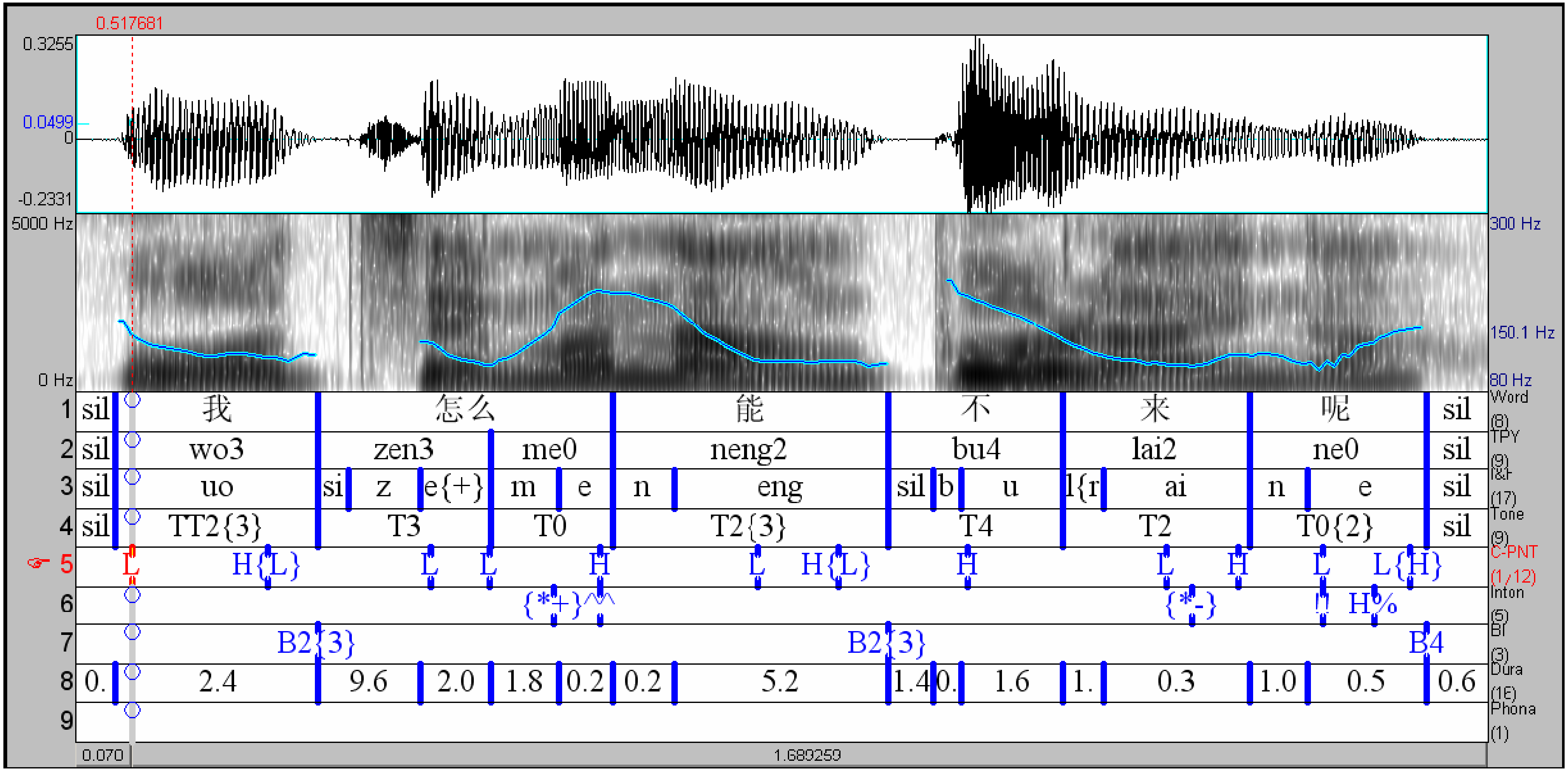
- The North Wind and the Sun
- 7 sentences, 143 Chinese characters

The Challenge in speech annotation

- □ Annotation plays an important roles in speech database.

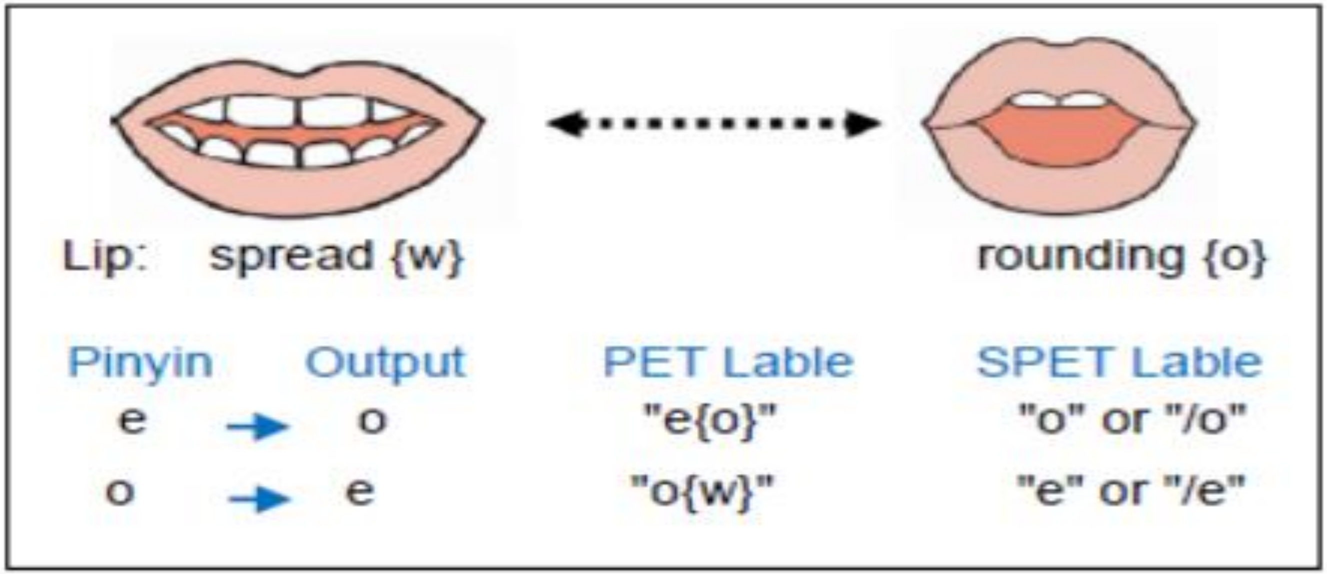
- □ Annotation is time and annotators consuming.
  - SLAM and Speech Analyzer POSCAT (Kim, B., 2000)(Godwinjones, R. 2009)
  - CHAT (Codes for the Human Analysis of Transcripts) (MacWhinney, 2000).
  - DARCLE Annotation Scheme (DAS) (Marisa Casillas, 2017).

Phonetic Labels



Pronunciation Erroneous Tendencies

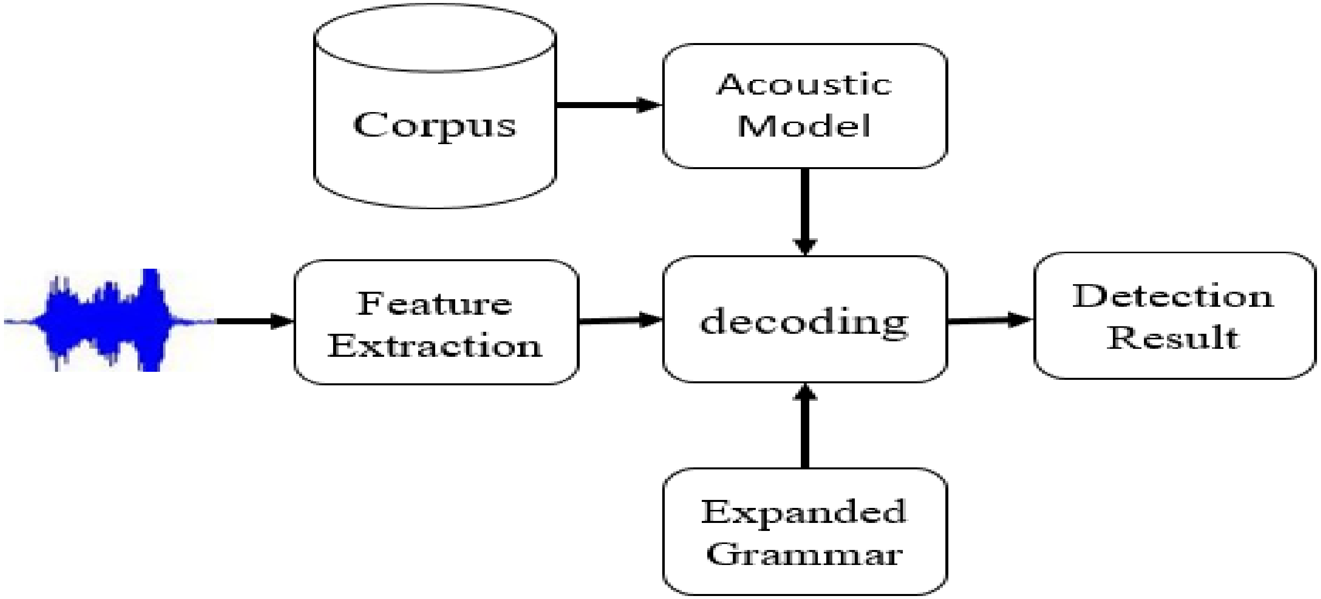
- □ Pronunciation Teaching
- □ PET/SPET



Pinyin		Output	PET Lable	SPET Lable
e	→	o	"e{o}"	"o" or "/o"
o	→	e	"o{w}"	"e" or "/e"

Semi-manual Annotation Automatic Label(1)

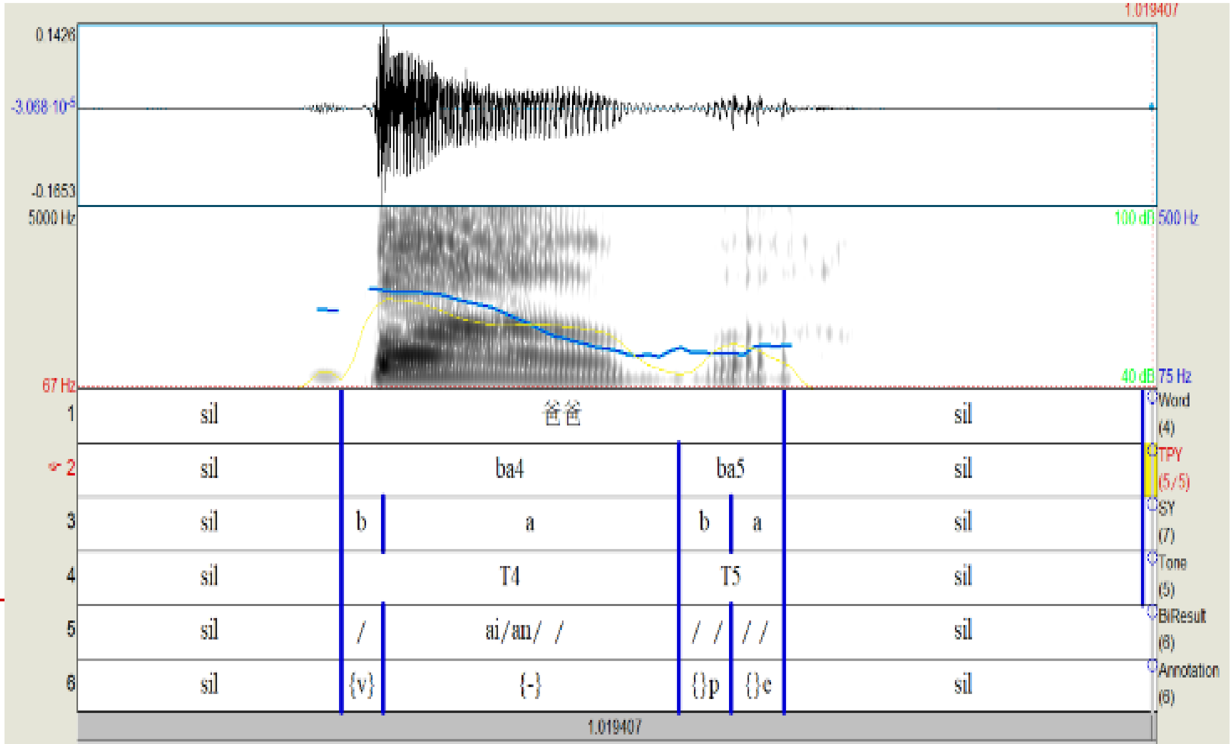
- □ state-of-the-art ASR: LSTM/Chain model
- □ an expanded grammar according to the length of input speech



Semi-manual Annotation Manual Label(2)

open-ended questions (choose one from all the initials and finals)

multiple-choice questions (choose one from four candidates)



Annotation Evaluation

Mean consistency rate (MCR):

In an extreme case, if the erroneous is very little and one annotator is lazy and labels zero erroneous. The consistency rate will also be high.

Posterior Probability Annotation Evaluation

$$F_1 = \frac{2\,\mathrm{Precision} * \mathrm{Recall}}{\mathrm{Precision} + \mathrm{Recall}}$$

the ground truth?

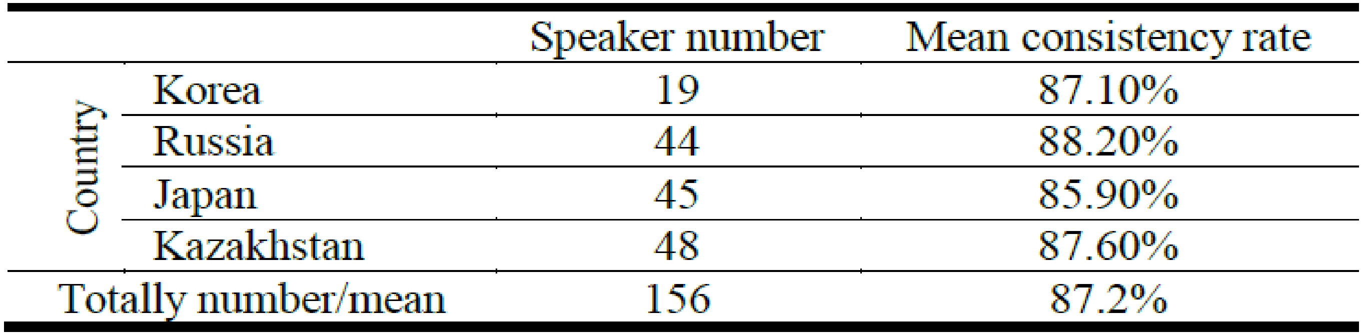
$$F_1p = \frac{2\,\mathrm{Precision} * \mathrm{Recall}}{\mathrm{Precision} + \mathrm{Recall}} * MCR$$

Posterior F1(F1p):

Annotation Results

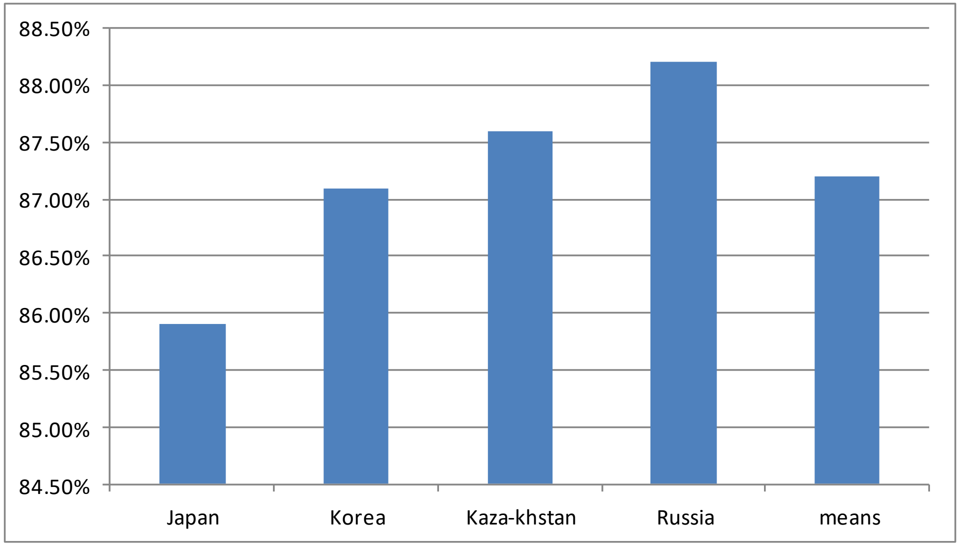
- □ 156 Speakers’ Word Set
- □ 284*156=44304 bi-syllable words
- □ Three annotators for each words

Speaker numbers & Mean consistency rate of phoneme annotations



		Speaker number	Mean consistency rate
Country	Korea	19	87.10%
	Russia	44	88.20%
	Japan	45	85.90%
	Kazakhstan	48	87.60%
Totally number/mean		156	87.2%

Annotation Results

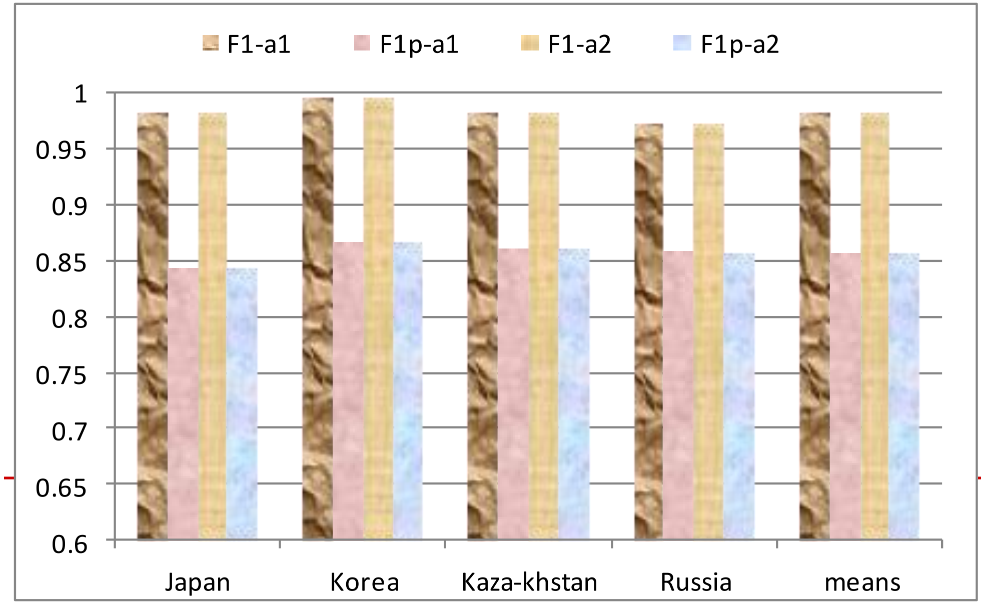


Mean consistency rate of each annotators

the consistency rate of the two annotators in this study raised from 80.7% to 87.2%,

Annotation Results

- Granted that the third annotator's label result is the ground truth.
- F1-a1 and F1-a2 are the F1 score of the first annotator and the second annotator



The F1 is extremely high.

The posterior F1 score is 0.857.

Conclusion

- □ Semi-manual annotation is a promising method in labelling speech data.
- □ The posterior F1 could measure the annotation result more reasonable.
- □ Annotation is still a challenge task.

Thanks