Recent Advance of Speech and Language Processing Technologies in Thailand

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Thai Language Processing

Spelling system

38 consonant sounds with alphabets

32 vowel sounds with 28 vowel forms

5 tones with 4 tone marks

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No word
boundary marker

No sentence
boundary marker

Ambiguous
phonology
Loan words
Exceptions

ASEAN Languages Related Projects

- **USTAR**
  - Universal Speech Translation Advanced Research
  - http://www.ustar-consortium.com/
  - Since 2006, hosted by NICT then I2R
  - VoiceTra4U-M then uniTrans mobile applications to access a network-based multilingual speech translation service

- **ASEAN-MT**
  - ASEAN Languages Translation Public Service
  - http://www.aseanmt.org/
  - 2012-2015, hosted by NECTEC

Progress of Thai ASR

- **Acoustic modeling**
  - 773 hours from various domains
  - Discriminative trained GMM and DNN
- **Language modeling**
  - 67M words from various domains
  - Hybrid word-subword modeling
    (70K lexicon covering up to 140K words)
- **Run-time performance**
  - 35% WER for GMM and 18% WER for DNN
    in real-noisy environments (8 dB SNR in average)
  - 1.2xRT via Docker-based distributed processing
- http://party.openservice.in.th/

- C. Wutiwiwatchai et al. 2016. Recent advance of Thai open-vocabulary automatic speech recognition. Journal of Intelligent Informatics and Smart Technology (2016), Vol.1, 1-7.
- V. Chunwijitra et al. 2016. A hybrid input-type recurrent neural network for LVCSR language modeling. EURASIP Journal on Audio, Speech, and Music Processing, 2016:15, 1-12.

Progress of ASEAN-MT

- **Resource development**
  - 200K parallel text of 9 ASEAN languages plus English
  - 52K name-entity dictionaries of 9 languages
  - Guideline for translation quality assessment

- **System development**
  - http://www.aseanmt.org/mt
  - ASEAN language translation public service

- **Run-time performance**
  - 57.3 max BLEU score (En>Vn)
    5.3 min BLEU score (My>La)
  - 0.05 sec/sentence run-time translation
  - 3.5 of 5.0 user satisfaction

Progress of Thai TTS

- **Text processing**
  - o G2P using CRF-based Joint Sequence Modeling to solve major problems e.g. tone distortion, load words
  - o Over 95% G2P conversion accuracy

- **Speech synthesis**
  - o Bilingual Thai/English HMM-based speech synthesis using bilingual voice talents
  - o Special treatment on tone-related question tree

- **Run-time performance**
  - o Under 1 sec response based on fast-track text processing
  - o Available platforms: SAPI, Linux Enterprise, Android

- http://vaja.nectec.or.th/

- S. Saychum et al. 2016. Efficient Thai grapheme-to-phoneme conversion using CRF-based joint sequence modeling. Proceedings of INTERSPEECH 2016, pp. 1462-1466.
- A. Rugchatjaroen et al. Generalization of Thai tone contour in HTS-based speech synthesis. To submit to APSIPA 2017.

Future ASEAN Related Projects

- **USTAR (ASEAN-IVO)**
  - Continue the USTAR network-based multilingual speech translation service via uniTrans application under I2R hosting
  - Update recent Thai speech translation services
  - Develop a 5K Thai phrase speech corpus

- **ALT (ASEAN-IVO)**
  - Join the ASEAN Language Treebank project under NICT hosting
  - Develop a 20K Thai treebank corpus

Future ASEAN Related Projects

- **Multilingual ASEAN Lexicon (ASEAN Organization)**
  - o Follow the previous ASEAN-MT project
  - o 20,000 entries of each participated language

- **ASEAN TTS (NECTEC)**
  - o Collaborate with ASEAN partners to develop usable text-to-speech synthesizers
  - o Target for Lao PDR in 2017, Myanmar and Bahasa Malay in 2018
  - o Create a general platform for building TTS

Thank you