Endangered Language Documentation: Bootstrapping a Chatino Speech Corpus, Forced Aligner, ASR

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Agenda

• Work based on the NSF-funded AARDVARC project (http://info.linguistlist.org/aardvarc/) (NSF #1244713)

• Creating the first San Juan Quiahije Eastern Chatino (CTP) Speech Corpus

• Experiment with Forced Alignment

• Why?
The Problems

• The Language Resource Bottleneck
• Large Data Collections in Archives
• The Transcription Bottleneck

From:
http://fitforprostatesurgery.com/get-fit-get-healthy/establish-an-exercise-routine/
Endangered Language Documentation

• Large collections of recordings over the last decades
  • Limited amount of transcribed, translated, or analyzed data

• Ethnologue lists 7,097 living languages (yesterday)
  • 1% of those languages are well-resourced.
  • Biodiversity and language diversity threatened in a similar way.
  • Large number of languages: unwritten, partially qualitatively documented, etc.
  • Growing gap between the low 99% and the 1% highly resourced languages.
Language Resources

• Audio and Video from documentary linguistic work
  • The Archive of the Indigenous Languages of Latin America at UT Austin (AILLA)
  • The Alaska Native Language Archive
  • DOBES, Max Planck Institute
  • SOAS, London
  • many more

• Lack of transcription, effort
  • 50 to 100 x real-time, i.e. one hour of recording requires 50 to 100 hours of work
Possible Approach

• Speech and video technologies (AARDVARC project)
  • Forced Alignment to speed up the production of speech corpora
  • Automatic Speech Recognition (ASR) for the recordings could speed up the transcription task.
    • Low number of speakers and longer spoken sequences = less signal variation.

• Task to estimate effort for:
  • Initial speech corpus for Forced Aligner (approx. 2 to 5 hours).
  • Effective corpus size for ASR.
The Chatino languages spoken in Oaxaca, Mexico
Chatino is a group of three languages
The shown scene was recorded by Lynn Hou.
This is how Chatino sounds

Margarita Balthazar Garcia, Cienequilla.
Typological features of the Chatino Languages

- Highly tonal (Especially Eastern Chatino)
- Strongly head-marking
- Head-initial syntax
- VSO word order
- Alienable vs. inalienable possession
- Complex verbal inflection classes
- Vigesimal numeral system
- No plural marking on nouns
- Excl vs. Incl. pronouns
TONES

Time Normalized F0 of Basic Chatino Tones

- MO
- H
- MH
- LM
- M
- toneless
- L
- ML
### Representation of tone

| Number  | Tonal group | gloss                |
|---------|-------------|----------------------|
| **Level tones** |             |                      |
| ska1+0  | skaK        | sugar                |
| kla1    | klaE        | Weaving loom         |
| kla2    | klaC        | water pool           |
| kla3    | klaF        | dream                |
| kla4    | klaA        | fish, old, star      |
| **Descending** |          |                      |
| kla24   | klaJ        | twenty               |
| tqwa14  | tqwaB       | cold                 |
| tyuq04  | tyuqM       | term of endearment   |
| **Ascending** |             |                      |
| kla42   | klaG        | you will arrive      |
| sqen32  | sqenl       | scorpion             |
| kla20   | klaH        | you will sing        |
| xkwan40 | xkwanL      | I will throw it      |
kta^E  ‘foráneo (foreign)’
kta^C  ‘harina (flour)’
kta^F  ‘chepil (chepil Crotalaria longirostrata)’
kta^A  ‘tabaco, se bañará (tabacco, s/he will take a shower)’
kta^G  ‘lo sebraras, te bañaras (you will take a shower)’
kta^H  ‘machucar (to bruise)’
kta^I  ‘se sembrará (it will be planted)’
Kta^B  ‘ganado (livestock)’
Approach

• Identification of text for reading and recording
• Recording initial speech corpus of 5 hours
• Transcription and time alignment
• Training a Forced Aligner
  • Prosodylab Aligner (PLA, Python module using HTK)
  • ELAN2split ([https://bitbucket.org/dcavar/elan2split](https://bitbucket.org/dcavar/elan2split)) corpus creation for PLA
  • Pronunciation dictionary (tokens plus tokenized phonetic transcription)
  • Espeak for Praat: Language model for TXT2Speech
• Extending the speech corpus
Outcome

• Initial speech corpus:
  • Approx. 5 hours speech transcribed and time aligned, PoS-tagged and translated
  • Initial annotation in ELAN (time-alignment correction in Praat)

• Workload (ignoring previous investment in text, transcription schema)
  • Ford Assembly Line approach: bootstrapping initial corpus, FA-training, …
  • 4 to 6 person weeks
  • Estimate $24,000 – 50,000
  • If we would do that for 3,500 languages: < $84 mil.
Resources

• GORILLA site (http://gorilla.linguistlist.org/)
  • Audio, ELAN and Praat transcription/annotation files
  • Corpus licenses: CC BY-SA, i.e. free for commercial use (donation-ware and copyright free resources)
  • Code and software: Apache 2.0 licensed, i.e. free for commercial use
  • Every resource comes with a paper to cite
  • LLOD-linked
  • CLARIN-linked
  • …
Resources

• Internships at LINGUIST List and Indiana University:
  • Work on LL resources, but also: corpus creation, speech and language technologies, qualitative and quantitative language related research
  • Corpora created with colleagues, students, native speakers and community members:
    • Chatino, Burmese, Turkic (Baharlu, Khorasan, Iran), Croatian, Russian, Spanish, …
  • Welcoming students from all over the world!
Wac xqweF
qwanJ

Hvala!