Pushing transcription work to the next level: Using ASR and LaBB-CAT for linguistic studies





Andreas Weilinghoff

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All resources (including slides) can be retrieved from:

https://andreas-weilinghoff.com/ASR.html

01 ASR

What is ASR?

"Automatic speech recognition (ASR) is the process and the related technology for converting the speech signal into its corresponding sequence of words or other linguistic entities by means of algorithms implemented in a device, a computer, or computer clusters."

(Deng and O'Shaughnessy 2003; Huang et al. 2001 cited in Li et al. 2016)

`pushing transcription work to the next level`

- research field for roughly 70 years

What is ASR?

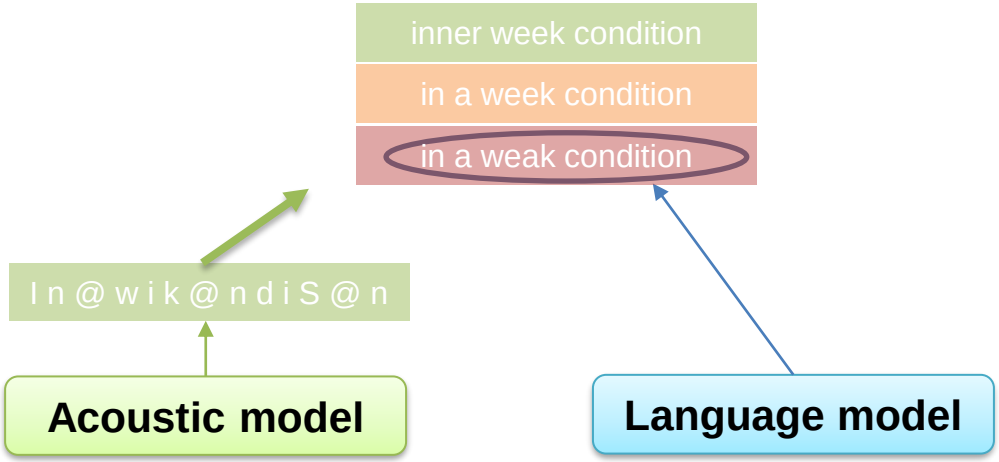
- great advancements in recent years due to

→ exponential growth of data
→ drastic increase of computing power
→ successful implementation of neural networks

applications: voice search, personal digital assistance systems (PDA), automated captioning, gaming etc.

transcription work ?!

How does ASR work?



Overview of ASR systems by Microsoft Research:

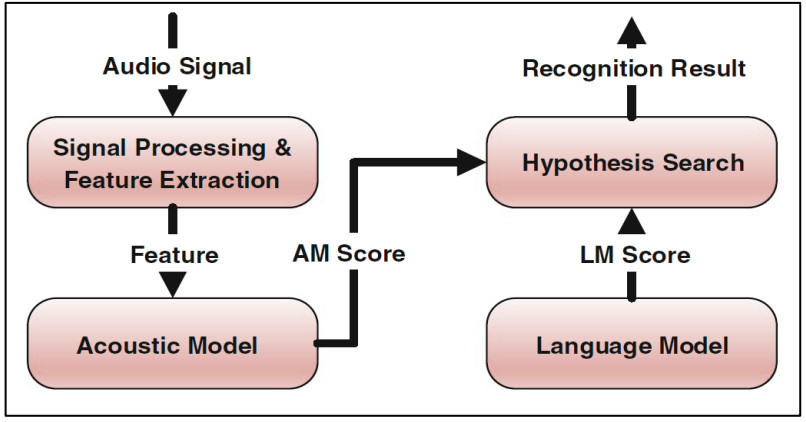
https://www.youtube.com/watch?v=q67z7PTGRi8

Previous presentation on ASR:

https://andreas-weilinghoff.com/docs/Seeking%20patterns%20in%20language.pdf

(Yu and Deng 2015: 4)

How does ASR work?



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ASR Services

Commercial:

→ IBM Watson STT

→ Microsoft Azure STT

→ Google Cloud STT

→ Amazon AWS STT

…

ASR Services

Non-commercial:

→ HTK toolkit (University of Cambridge)

→ CMU Sphinx toolkit

→ Kaldi toolkit

Further platforms/libraries: Common Voice (Mozilla), Tensorflow (Google)

IBM Watson STT

IBM Cloud Watson STT

https://www.ibm.com/cloud/watson-speech-to-text

- state of the art ASR service
- long soundfile transcription possible
- includes timestamps and word alignment
- robustness & different language models (e.g AusE, BrE, AmE)
- user-friendly, adaptable and well documented
- free of charge (500 minutes per month for Lite users)

→ Accessible for academic users via WebMAUS interface

IBM Watson STT via API

Prerequisites: You need an IBM Cloud Account and have Python installed on your machine. You also need to install the textgrids library by Tommi Nieminen.

IBM Cloud Watson STT

https://www.ibm.com/cloud/watson-speech-to-text

1. Get Testfile from https://andreas-weilinghoff.com/ASR.html and store it on your machine (make sure you can find the directory)
2. Set-up Watson Speech to Text service and get personal API & URL
3. Copy script Watson_STT_To_Textgrid from https://andreas-weilinghoff.com/index.html#code and adapt file directory, API & URL

IBM Watson STT via BAS Web Services

1. Get Testfile from https://andreas-weilinghoff.com/ASR.html and store it on your machine (make sure you can find the directory)
2. Go to BAS Web Services and select "ASR". Log-in with your institutional account or BAS user license and upload Testfile.wav
3. Set up the service options, accept the license agreement
4. Hit "Run Web Service"

BAS Web Services

https://clarin.phonetik.uni-muenchen.de/BASWebServices/interface

IBM Watson STT via BAS Web Services

Another option for easier correction:

→ Transform word level transcription into utterance level transcription with word_to_utterance_2.0 python script from https://andreas-weilinghoff.com/#code

02 LaBB-CAT

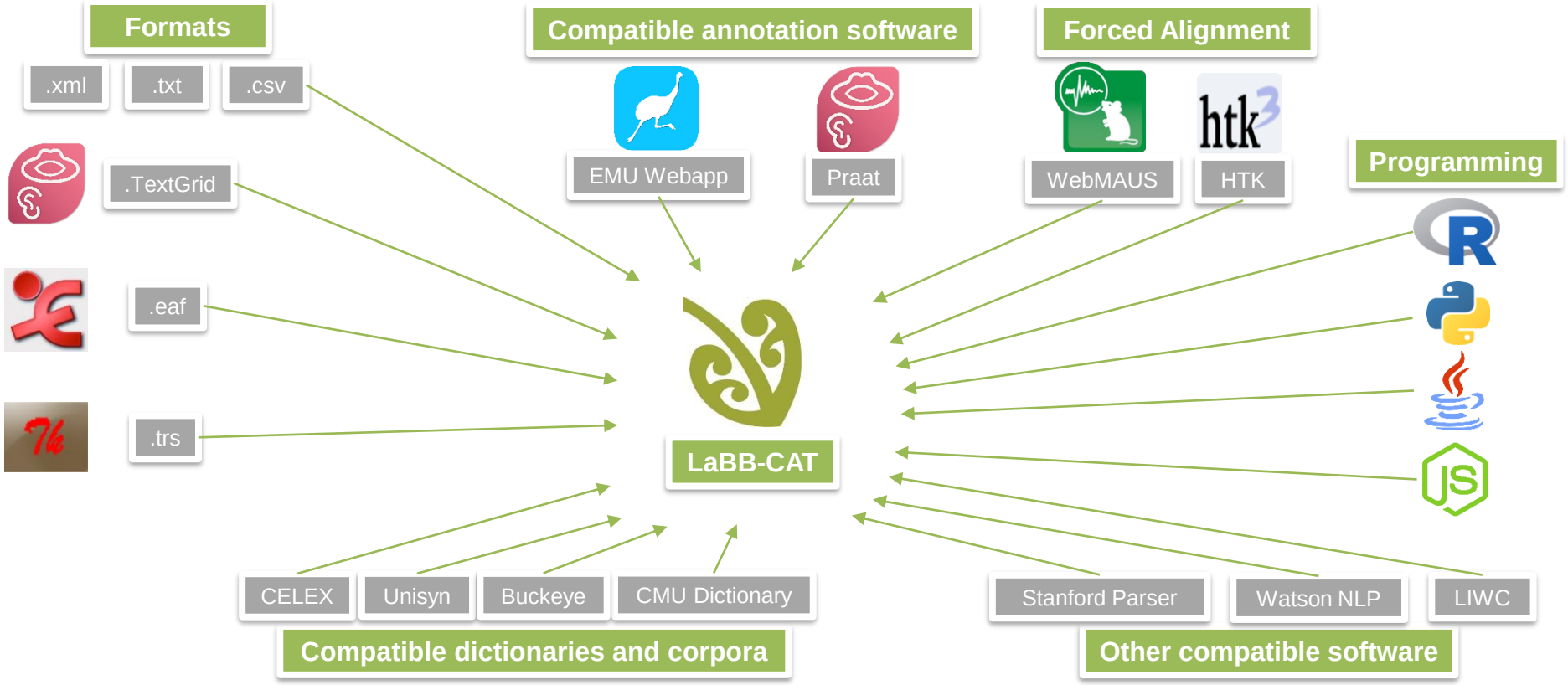
What is LaBB-CAT?

LaBB-CAT

https://labbcat.canterbury.ac.nz/system/

LaBB-CAT is a **browser-based linguistics research tool** developed by Robert Fromont and Jen Hay at the New Zealand Institute of Language, Brain and Behaviour (Fromont and Hay 2012)

- → stores audio/video recordings, transcripts and other annotations of different formats as well as participant background data
- → enables automatic and manual annotations on different layers
- → includes search function with regular expressions
- → compatible with other (linguistic) software


Formats
.xml
.txt
.csv
.TextGrid
.eaf
.trs
Compatible annotation software
EMU Webapp
Praat
Forced Alignment
WebMAUS
HTK
Programming
LaBB-CAT
CELEX
Unisyn
Buckeye
CMU Dictionary
Compatible dictionaries and corpora
Stanford Parser
Watson NLP
LIWC
Other compatible software

LaBB-CAT: Preparing and uploading files

LaBB-CAT

https://labbcat.canterbury.ac.nz/system/

1. Check utterance transcription of Testfile
   Optional: Rename file and tier names for better overview
2. Upload file to LaBB-CAT
3. Adapt participants settings
4. Check out CELEX layer managers

LaBB-CAT: Searching, annotating and exporting

LaBB-CAT

https://labbcat.canterbury.ac.nz/system/

1. Check out search function
2. Layer annotation
3. Export functions

03 DISCUSSION

ASR: Advantages

- → automatic pre-processing of data (great assistance for transcription work)
- → time saving
- → less tedious workflow
- → less “random“ errors → more consistent data preparation

ASR: Limitations

- depending on the research project, manual checking and correcting remains necessary
- Data protection issues for different services
- limited amount of language models
- performance depends on input

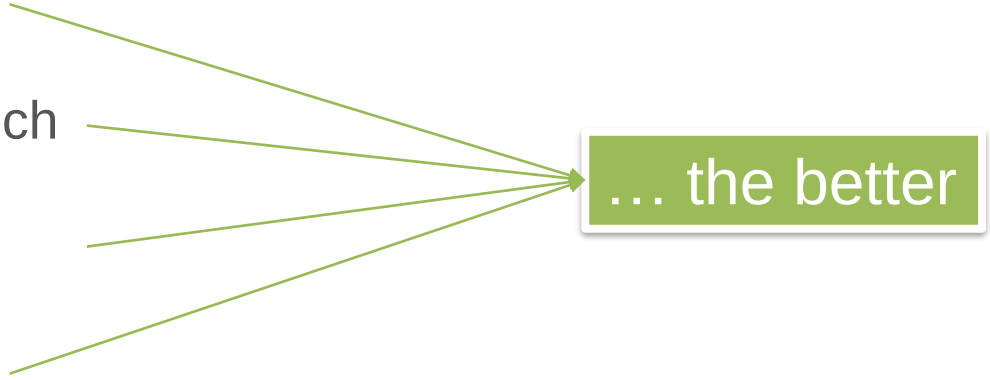
ASR Limitations

... the higher the audio quality

... the more structured the speech

... the less regional the speech

... the less speakers involved?



LaBB-CAT: Advantages

- → user-friendly interface
- → well documented and great support by authors
- → compatibility with different file formats and programs
- → search function (→ efficient data preparation and analysis)

LaBB-CAT: Limitations

→ some add-ons (e.g. HTK) are difficult to set up (at least on Windows)

04 REFERENCES

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Yu, D., Deng, L. (2015). *Automatic Speech Recognition: A Deep Learning Approach*. London: Springer Publishing.

Summary of useful resources

Speech processing / forced alignment:

BAS Webservices (WebMAUS) https://clarin.phonetik.uni-muenchen.de/BASWebServices/

DARLA http://darla.dartmouth.edu/cave

Montreal Forced Aligner https://github.com/MontrealCorpusTools/Montreal-Forced-Aligner

FAVE Aligner https://github.com/JoFrhwld/FAVE

Summary of useful resources

Toolkits:

HTK https://htk.eng.cam.ac.uk

CMUSphinx https://cmusphinx.github.io/

Kaldi ASR https://kaldi-asr.org/

Summary of useful resources

IBM Watson:

IBM Watson STT https://www.ibm.com/cloud/watson-speech-to-text

Nicolas Renotte

https://www.nicholasrenotte.com/
https://github.com/nicknochnack
https://www.youtube.com/channel/UCHXa4OpASJEwrHrLeIzw7Yg