LING 120:
Language and Computers

Semester: Fall '17

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Outline

- Discussion about yesterday's exercise
- Working with spoken language - general issues discussion
- Final Exam - process and topics discussion
- Exercise about Machine Translation

Attendance Exercise from last class

- We briefly talked about an automated scoring system in text classification class (i.e., classifying English writing into beginners, intermediate, advanced learners) like in exams like GRE, TOEFL etc.
- Scenario: Test taker gets a question, they respond with, say, a 1 minute speech on that, and you get the speech file.
- If we were to do the same kind of classification system with with these files, what do we need?
- What resources do I need for such a classifier? What kind of features should I extract? Once I get all the "features", can I use same classification algorithms and evaluation metrics as for written responses?
- Hint: We already saw speech recognition is possible even with a audio file as input (swiftscribe.ai demo)

Your Responses and my comments

- Your responses - summary
  - Features: Convert Speech to Text (ASR) and work with the text to get features like for written responses (grammar, vocabulary etc)
  - You can include Speech features such as: fluency, breaks, interruption words like umm.
- My comments on this:
  - While ASR is necessary, there are also certain aspects one can extract from the speech signal itself that can be useful (intonation patterns, pause frequencies and durations etc)
  - Once features are extracted, rest of the procedure for classification will be the same.

Processing ASR output

How is it different from written language?

- What should we do about silences?
- What should we do with repetitions?
- What should we do with disfluencies (um, ah, etc)? Should we treat all of them the same? or do they mean different things?
- What should we do with transcription/ASR errors?

In practice, depending on the application scenario, and what kind of speech transcripts are you using - custom decisions are taken.

Architecture of an automated speech scoring system

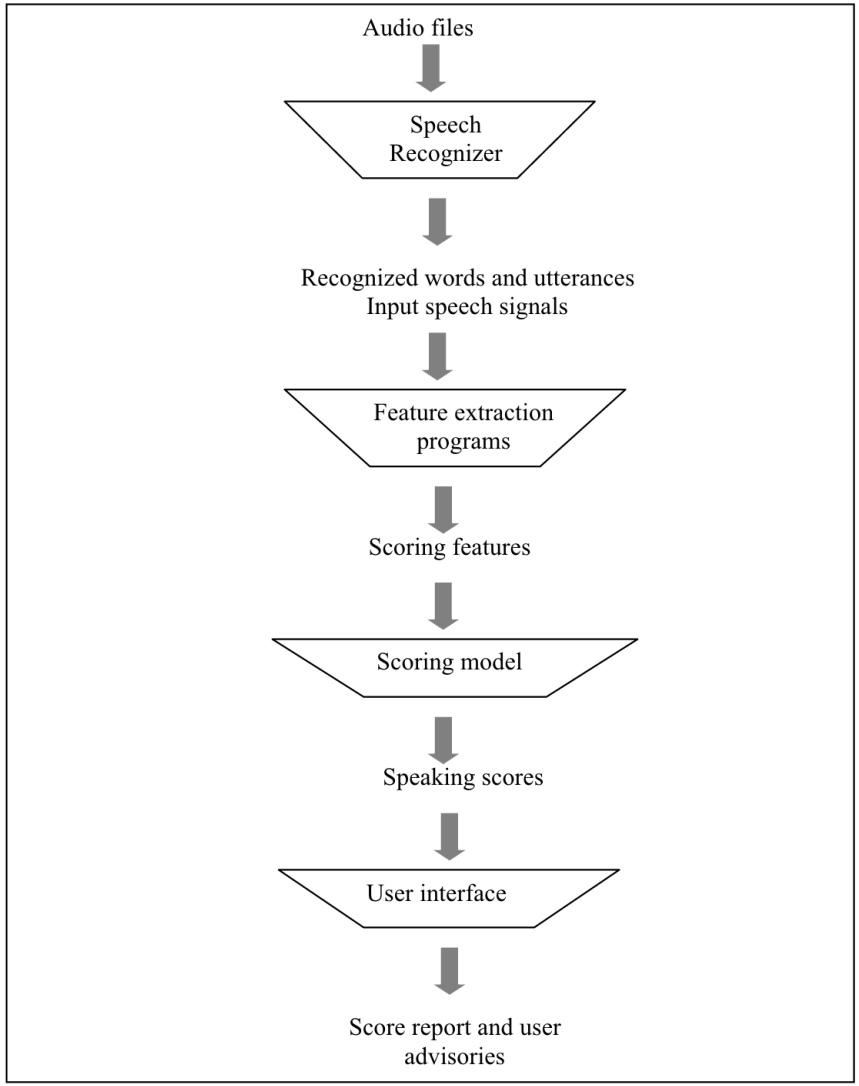

Figure 3. **Architecture of an automated speech scoring system.**

source: SpeechRater software by Educational Testing Service
http://onlinelibrary.wiley.com/doi/10.1002/j.2333-8504.2008.

What kind of features should be developed for this task?

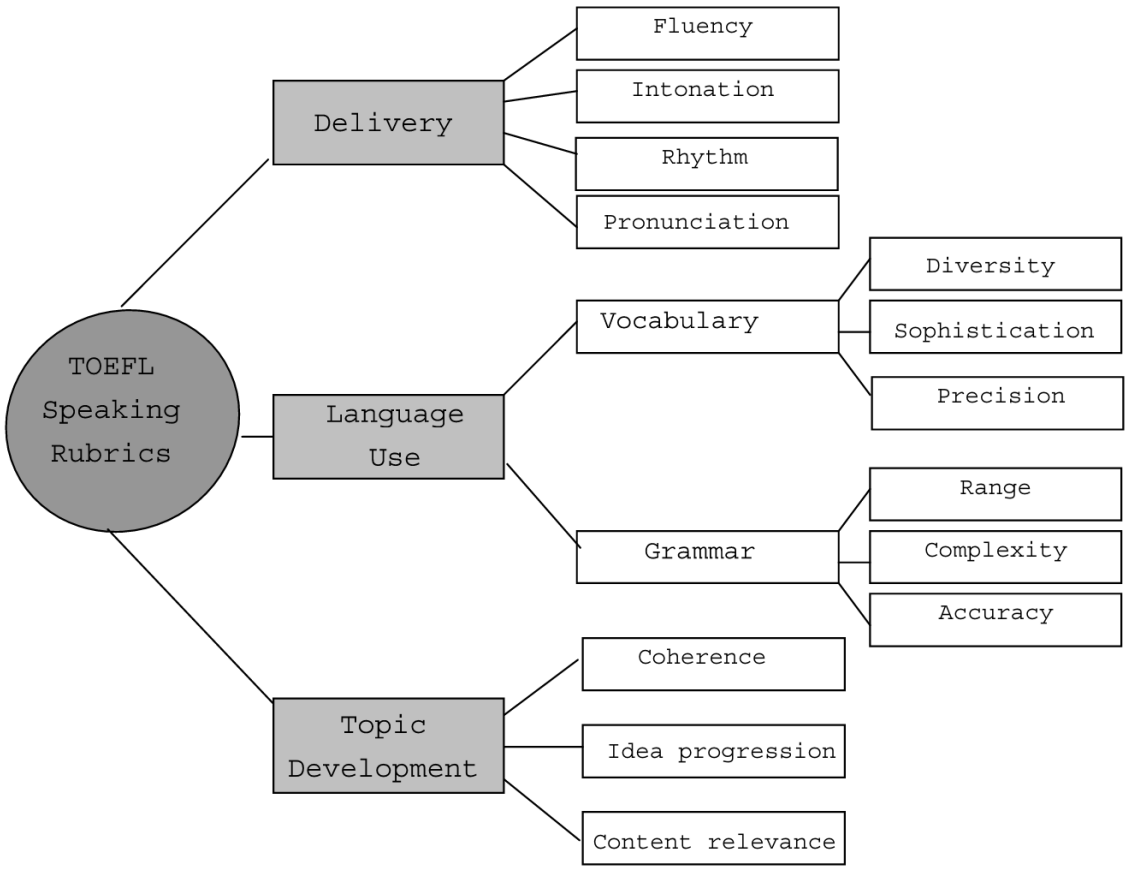

Figure 4. **The construct of speech for the TOEFL Internet-based test represented by the scoring rubric.**

source: SpeechRater technical report from 2008
http://onlinelibrary.wiley.com/doi/10.1002/j.2333-8504.2008.tb02148.x/epdf

Where else speech processing involving language use useful?

- Speech based human-computer interfaces (Siri)
- Speech to Speech translation (Skype translator demo: `https://www.youtube.com/watch?v=0I5Is7Qc8yY`)
- Speaker/Dialect identification, detecting deception etc (homeland security)
- Tutoring systems, voice systems etc. (Hawking's speaker)
- Studying neuro-generative disorders and others that can affect our use of language (e.g., alzheimers, aphasia, dyslexia etc) (Yes, this is real!)

Remaining Weeks

- We have three weeks of instruction left (wow!)
- There is only one main topic to cover (may be next week): Machine Translation
- Remaining 2 weeks: Some other assorted topics and discussions, classroom projects, final exam related work.
- If you want me to discuss something (related to the course!), post on the Canvas forum about discussion topics.
- Grade improvement seekers: set up a time to meet in last week of classes, give me any 3 topics you are comfortable with, and do an oral exam with me. (Maximum grade increase: 5%. If you really do extra-ordinarily well, and if your Assignment scores do not reflect that at all, I can consider increasing further).

Final Exam

- Carries: 20% of your grade, and involves writing 2 short essays.
- Has to be submitted in three parts:
  1. Write a part of the assignment (one question) and submit by 2nd December - 5%
  2. Do an in-class peer review of one of your classmate's work (6th December) - 5% - if you don't come to class, you don't get graded for this part.
  3. Final submission (of both the questions) - 10%
- Exact details about word limits, how to submit and list of topics for questions are on Canvas.

Attendance Exercise

Our next (last) topic is Machine Translation. Here is a small exercise that will give a preview of what machine translation is. Work in groups of 2–3 people.