Web-based Vocabulary Selection for Speech Recognition of Lectures
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The interACT Lecture Translation System

Components of the Lecture Translation System

• Vocabulary selection critical for successful adaptation to individual lectures
• Vocabulary influences speech recognition and machine translation accuracy

“Today, I will talk about new tones second law, the genetics of particles.”

PROBLEM
• Important keywords are misrecognized
• System not optimized for lecture topic

PROPOSED SOLUTION
• Adapt system to topic of lecture
  – Utilizing materials available before lecture begins

“Today, I will talk about Newton’s second law, the kinetics of particles.”

Web-based Topic Adaptation

Vocabulary Selection
1. Utilize materials that are available before the lecture starts (e.g. lecture slides)
2. Select short phrases of up to three words as search queries
3. Search for documents (HTML and PDF) in the web using these queries
4. Filter documents that are in another language
5. Calculate word features, rank words using a combination of features, and select active system vocabulary

Language Model Adaptation
1. Use collected document corpus to adapt language model

Experimental Evaluation

Feature Ranking
• Rank vocabulary with proposed features
• Doc × VocCount obtains lowest OOV rate
• DocCount best single feature

Vocabulary Selection
• Avg. 60% lower OOV rate (up to 84%)
• Proposed 40k vocabulary obtains better coverage than 300k baseline

Web-based Topic Adaptation
• Avg. 12.3% lower WER (up to 21.6%)
• Proposed approach always improves speech recognition accuracy

http://speech.sv.cmu.edu/projects/WebAdaptation

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