Computer Science Colloquium

"Improving text entry in augmentative and alternative communication (AAC) devices with language models"

Dr. Brian Roark

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Abstract

In this talk, I'll present work on language modeling for augmentative and alternative communication (AAC). Scanning methods over fixed grids of symbols provide the means of keyboard emulation using simple binary switches, when standard touch typing and other communication modalities are not available for individuals due to motor impairments or other disabilities. Speed of typing is a great concern in these applications and language models can provide speedups in a number of ways. Most frequently, word completion and prediction approaches are used to reduce the number of keystrokes required. For our work, we have focused on using language models to improve the scanning algorithm. I'll present a novel scanning method based on Huffman codes, which we term 'Huffman scanning' that leverages n-gram models and Huffman coding to achieve scanning speedups. Our approach accounts for the probability of typing error in a very natural way.

In the second part of the talk, I will tie this work back to our NIH-funded Brain-Computer Interface (BCI) project, where rapid serial visual presentation is being used with single trial ERP detection to provide a scanning interface. I will discuss the many differences between this interface and commonly used scanning interfaces and the various ways in which language models can be used within it, along with some new ideas on optimization in this context. Finally, I'll conclude by situating this work within the broader enterprise of using natural language processing for behavioral assessment and assistance, and mention a few other ongoing projects in this vein.

Joint work with Melanie Fried-Oken, Barry Oken, Deniz Erdogmus, Russ Beckley, Andrew Fowler and Chris Gibbons

Biography

Brian Roark is an Associate Professor in the Center for Spoken Language Understanding (CSLU) at Oregon Health & Science University (OHSU). He received his PhD from Brown University in 2001 and spent 3 years in the Speech Algorithms Department at AT&T Labs - Research before joining CSLU. His research interests include natural language processing, syntactic parsing of text and speech, language modeling for various applications, probabilistic models of human language processing, spoken language processing for behavioral assessment, and augmentative and alternative communication.

Date: Friday, May 4, 2012
Time: 1:30pm to 2:30pm
Location: ECS South 2.410

Refreshments will be served at 1:15pm