Exploiting Query Click Logs for Spoken Language Understanding

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Abstract:
In the last decade, a variety of practical goal-oriented spoken dialog systems have been built for limited domains. One of the key tasks in such targeted spoken language understanding (SLU) applications is utterance domain classification, often completed first in SLU, serving as a top-level triage for subsequent processing. Domain detection systems are often framed as a classification problem, however, collecting and annotating naturally spoken utterances to train these domain classifiers if often costly, representing a significant barrier to deployment both in terms of effort and finances. On the other hand, large-scale engines such as Bing or Google log more than 100M search queries per day. Each query in the log has an associated set of URLs that were clicked after the users entered the query. This user click information could be used to infer domain class labels and, therefore, provide (noisy) supervision in training domain classifiers. Hence, it may be possible overcome this hurdle by leveraging the abundance of "implicitly labeled" web search queries in search engines.

In this talk, I will briefly present SLU in our spoken dialog system. Then, I will describe our two-step approach to exploit search queries mined from search engine query logs to improve domain detection. In the first part of this process, we sample high-quality query click data by mining query click logs and using classification confidence scores. We then extend the label propagation algorithm, a graph-based semi-supervised learning approach, to incorporate noisy domain information estimated from search engine links the users click following their queries. We show that most semi-supervised learning methods we experimented with improve the performance of the supervised training, and the biggest improvement is achieved by label propagation that uses noisy supervision.

About the Speaker:
Dilek Hakkani-Tur is a principal scientist at the Microsoft Speech Labs. Prior to joining Microsoft, she was a senior researcher at the International Computer Science Institute and senior technical staff member in the Voice Enabled Services Research Department at AT&T Labs-Research in Florham Park, NJ. She received her BSc degree from Middle East Technical University, in 1994, and MSc and PhD degrees from Bilkent University, Department of Computer Engineering, in 1996 and 2000, respectively. Her PhD thesis is on statistical language modeling for agglutinative languages. She worked on machine translation during her visit to Carnegie Mellon University, Language Technologies Institute in 1997, and her visit to Johns Hopkins University, Computer Science Department, in 1998. In 1998 and 1999, she worked at SRI International, Speech Technology and Research Labs, and studied using lexical and prosodic information for information extraction from speech.
Her research interests include natural language and speech processing, spoken dialog systems, and active and unsupervised learning for language processing. She has 10 patents and co-authored more than 100 papers in natural language and speech processing. She is the recipient of three best paper awards for her work on active learning, from IEEE Signal Processing Society (with Giuseppe Riccardi), ISCA (with Gokhan Tur and Robert Schapire) and EURASIP (with Gokhan Tur and Robert Schapire). She is a senior member of IEEE and a member of ISCA, Association for Computational Linguistics. She was an associate editor of IEEE Transactions on Audio, Speech and Language Processing between 2005 and 2008 and is an elected member of the IEEE Speech and Language Technical Committee (2009-2012) and a member of the HLT advisory board. She is an associate editor of the Journal of Dialogue Systems and is serving as the co-chair of the IEEE workshop on Spoken Language Technology (SLT-2010), in Berkeley, CA.