

## **Learning from Natural Instructions**

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Machine learning is traditionally formalized as the study of learning concepts and decision functions from labeled examples, thus requiring representations that encode information about the target function's domain. We are interested in providing a way for a human teacher to interact with an automated learner using natural instructions which communicate relevant domain expertise to the learner without necessarily knowing a thing about the internal representation or the learning program.

This talk focuses on the machine learning aspects of this problem. The key challenge is to learn natural language interpretations without being given direct supervision at that level; for example, a plausible feedback could be the success or failure of the performed instruction.

We will present research on Constrained Conditional Models (CCMs), a framework that augments probabilistic models with declarative constraints in order to support learning such interpretations. In CCMs we formulate natural language interpretation problems as Integer Linear Programs and learning of the objective functions is done via constraints-driven learning and through global inference that account for the interdependencies among interpretation's components. In particular, we will focus on new algorithms for training these global models using easy-to-get indirect supervision signals and show the contribution of indirect supervision to other NLP tasks such as Information Extraction, Transliteration and Textual Entailment.

Short Bio:

Dan Roth is a Professor in the Department of Computer Science and the Beckman Institute at the University of Illinois at Urbana-Champaign and a University of Illinois Scholar. He is the director of a DHS Center for Multimodal Information Access & Synthesis (MIAS) and also has faculty positions in Statistics, Linguistics and at the School of Library and Information Sciences.

Roth is a Fellow of AAAI for his contributions to the foundations of machine learning and inference and for developing learning-centered solutions for natural language processing problems. He has published broadly in machine learning, natural language processing, knowledge representation and reasoning, and learning theory, and has developed advanced machine learning based tools for natural language applications that are being used widely by the research community.

Prof. Roth has given keynote talks in major conferences, including AAAI, EMNLP and ECML and presented several tutorials in universities and conferences including at ACL and EACL. Roth was the program chair of AAAI'11, CoNLL'02 and of ACL'03, and is or has been on the editorial board of several journals in his research areas and has won several teaching and paper awards. Prof. Roth received his B.A Summa cum laude in Mathematics from the Technion, Israel, and his Ph.D in Computer Science from Harvard University in 1995.