Reading Scholarly Literature

TRU Library Fall 2016
A Cognitive Model for the Representation and Acquisition of Verb Selectional Preferences

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Abstract
We present a cognitive model of inducing verb selectional preferences from individual verb usages. The selectional preferences for each verb argument are represented as a probability distribution over the set of semantic properties that the argument can possess—a semantic profile. The semantic profiles yield verb-specific conceptualizations of the arguments associated with a syntactic position. The proposed model can learn appropriate verb profiles from a small set of noisy training data, and can use them in simulating human plausibility judgments and analyzing implicit object alternation.

1 Introduction
Verbs have preferences for the semantic properties of the arguments filling a particular role. For example, the verb eat expects that the object receiving its theme role will have the property of being edible, among others. Learning verb selectional preferences is an important aspect of human language acquisition, and the acquired preferences have been shown to guide children’s expectations about missing or upcoming arguments in language comprehension (Nation et al., 2003).

Resnik (1996) introduced a statistical approach to learning and use of verb selectional preferences. In this framework, a semantic class hierarchy for words is used, together with statistical tools, to induce a verb’s selectional preferences for a particular argument position in the form of a distribution over all the classes that can occur in that position.

Resnik’s model was proposed as a model of human learning of selectional preferences that made minimal representational assumptions; it showed how such preferences could be acquired from usage data and an existing conceptual hierarchy. However, his and later computational models (see Section 2) have properties that do not match with certain cognitive plausibility criteria for a child language acquisition model. All these models use the training data in “batch mode”, and most of them use information theoretic measures that rely on total counts from a corpus. Therefore, it is not clear how the representation of selectional preferences could be updated incrementally in these models as the person receives more data. Moreover, the assumption that children have access to a full hierarchical representation of semantic classes may be too strict. We propose an alternative view in this paper which is more plausible in the context of child language acquisition.

In previous work (Alishahi and Stevenson, 2005), we have proposed a usage-based computational model of early verb learning that uses Bayesian clustering and prediction to model language acquisition and use. Individual verb usages are incrementally grouped to form emergent classes of linguistic constructions that share semantic and syntactic properties. We have shown that our Bayesian model can incrementally acquire a general conception of the semantic roles of predicates based on exposure to individual verb usages (Alishahi and Stevenson, 2007). The model forms probabilistic associations between the semantic properties of arguments, their syntactic positions, and the semantic primitives profiles during the course of learning, and compare it with data for different age groups, as we do with semantic roles (Alishahi and Stevenson, 2007).

We have shown that the model can predict disambiguated semantic profiles for a variety of verbs, and use these profiles to simulate human judgments of verb-argument plausibility, using a small and highly noisy set of training data. The model can also use the profiles to measure verb-argument compatibility, which was used in analyzing the implicit object alternation.

References
Parts of an Academic Article

• Introduction & Literature Review = WHERE did this research come from?
• Methods & Results = WHAT is this research
• Discussion & Conclusions = What does this research mean?
• References = Where should I look next?

• So...where should you focus your attention? And what’s the best source for quotable material?
Reading Takes Time

- It’s difficult to tell what’s relevant without putting in time to read first
- Relevance may not become apparent until you’ve read a few more articles
- SCAN articles the first time through (though scan with your mind open...don’t just move past the words, you’ll need to pick up on the ideas!)
A Few Reading Suggestions

• Skim to get the general idea first
• Then make TIME for slow, in-depth reading
• Print out the article
• Read with a pen in hand. Make notes! Circle ideas!
• Have a conversation with the author
• Make connections
Scholarly Articles Challenge Us All

- Faculty average reading 271 articles per year
- Faculty spend on average 132 hours per year reading.
- Nearly 10% of reading takes faculty 3+ hrs
- Add 5.6 hours per year searching and 9.9 hours browsing...and that's for faculty, who are familiar with the publications in their field, and have experience searching. Students can reasonably expect things to take longer!


Any other questions?