Preface

Ambiguity and variability are two basic and pervasive phenomena character-
izing lexical semantics. In this book we introduce a computational model for
lexical semantics based on Semantic Domains. This concept is inspired by the
"Theory of Semantic Fields", proposed in structural linguistics to explain lex-
ical semantics. The main property of Semantic Domains is lexical coherence,
i.e. the property of domain-related words to co-occur in texts. This allows us
to define automatic acquisition procedures for Domain Models from corpora,
and the acquired models provide a shallow representation for lexical ambiguity
and variability. Domain Models have been used to define a similarity metric
among texts and terms in the Domain Space, where second-order relations
are reflected. Topic similarity estimation is at the basis of text comprehen-
sion, allowing us to define a very general domain-driven methodology. The
basic argument we put forward to support our approach is that the infor-
mation provided by the Domain Models can be profitably used to boost the
performances of supervised Natural Language Processing systems for many
tasks. In fact, Semantic Domains allows us to extract domain features for
texts, terms and concepts. The obtained indexing, adopted by the Domain
Kernel to estimate topic similarity, preserves the original information while
reducing the dimensionality of the feature space. The Domain Kernel is used
to define a semi-supervised learning algorithm for Text Categorization that
achieves state-of-the-art results while decreasing by one order the quantity
of labeled texts required for learning. The property of the Domain Space to
represent together terms and texts allows us to define an Intensional Learning
schema for Text Categorization, in which categories are described by means
of discriminative words instead of labeled examples, achieving performances
close to human agreement. Then we investigate the role of domain information
in Word Sense Disambiguation, developing both unsupervised and supervised
approaches that strongly rely on the notion of Semantic Domain. The former
is based on the lexical resource WORDNET DOMAINS and the latter exploits
both sense tagged and unlabeled data to model the relevant domain distinc-
tions among word senses. The proposed supervised approach improves the

state-of-the-art performance in many tasks for different languages, while reducing appreciably the amount of sense tagged data required for learning. Finally, we present a lexical acquisition procedure to obtain Multilingual Domain Models from comparable corpora. We exploit such models to approach a Cross-language Text Categorization task, achieving very promising results.

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