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Programming Language Techniques for Natural Language Applications

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Abstract

It is easy to imagine machines that can communicate in natural language. Constructing such machines is more difficult. The aim of this thesis is to demonstrate how declarative grammar formalisms that distinguish between abstract and concrete syntax make it easier to develop natural language applications.

We describe how the type-theorectical grammar formalism Grammatical Framework (GF) can be used as a high-level language for natural language applications. By taking advantage of techniques from the field of programming language implementation, we can use GF grammars to perform portable and efficient parsing and linearization, generate speech recognition language models, implement multimodal fusion and fission, generate support code for abstract syntax transformations, generate dialogue managers, and implement speech translators and web-based syntax-aware editors.

By generating application components from a declarative grammar, we can reduce duplicated work, ensure consistency, make it easier to build multilingual systems, improve linguistic quality, enable re-use across system domains, and make systems more portable.