Grammatical Framework:
an Interlingual Grammar Formalism

Tutorial

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Abstract Grammatical Framework (GF) was born at Xerox Research Centre Europe in 1998. Its purpose was to provide a declarative grammar formalism for interlingual translation systems. The core of GF is Constructive Type Theory (CTT), also known as Logical Framework, which is used for building interlingual representations. On top of these representations, GF provides a functional programming language for defining reversible mappings from interlinguas to concrete languages, equivalent to Parallel Multiple Context-Free Grammars (PMCFG).

Open-source since 1999, GF has a world-wide community that has built comprehensive grammars for over 40 languages. GF is also used in several companies to build applications for translation, natural language generation, semantic analysis, chatbots, and dialogue systems. The focus has been on Controlled Natural Languages (CNL), but recent research has also combined GF with statistical and machine learning techniques, such as neural dependency parsing. In this way, GF can scale up to robust and wide-coverage language processing, without sacrificing explainability.

The tutorial is meant for an audience that has some experience with formal language theory and its use in practical implementations. However, it is self-contained and does not assume specific knowledge such as CTT or PMCFG. The structure is the following:

1. Hands-on introduction (45 min). Interactive coding in the GF Cloud to get an idea of how GF works.

2. Theoretical background (45 min). GF as a formalism and programming language, with references to its main inspirations (constructive type theory, Montague grammar, categorial grammars, XFST)

3. The GF Ecosystem (30 min). Software tools, on-going academic research, commercial applications, and open-source community activities.

References

Krasimir Angelov, *The Mechanics of the Grammatical Framework*, PhD Thesis, Chalmers University of Technology, 2011. *Standard reference on the internals of GF, from both implementation and formal language theory point of view*.

Peter Ljunglöf, *Expressivity and Complexity of the Grammatical Framework*, PhD Thesis, University of Gothenburg, 2004. *Detailed study of the language-theoretic properties of GF, placing it among mildly context-sensitive formalisms*.

Aarne Ranta, *Grammatical Framework: Programming with Multilingual Grammars*, CSLI, Stanford, 2011. *Standard reference on the GF programming language, with a tutorial and reference manual*.

Aarne Ranta, "What are Grammars Good for? Reflections on Twenty Years of Grammatical Framework", in Cleo Condoravdi and Tracy Holloway King (eds), *Tokens of Meaning. Papers in Honor of Lauri Karttunen*, CSLI, Stanford, 2019, pp. 545–568. *Follow-up of recent research themes, with some parallels to Xerox Finite State Tool, which was an important inspiration for GF*.

GF homepage: `http://www.grammaticalframework.org/`
Speaker's homepage: `http://www.cse.chalmers.se/~aarne/`