

Logical Modeling

The IDP³ System and the FO(\cdot) Language

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The IDP³ System and the FO(\cdot) Language

Overview

- ▶ IDP³: *Inductive Definition Programming*
- ▶ FO(\cdot): *First Order + Extensions*

<https://dtai.cs.kuleuven.be/software/idp>

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Many-sorted Logic (informally)

- ▶ variables have an associated type, and
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Aggregate Terms

- ▶ functions over a set of domain elements and associated num. values,
- ▶ mapped e.g. to the *sum*, *cardinality*, *minimum* value of the set.

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- ▶ Theories

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- ↪ Definitions are of the form $\forall \bar{x} : p(\bar{x}) \leftarrow \phi[\bar{x}]$, where ϕ is an FO(\cdot) formula

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 - ↪ Definitions are of the form $\forall \bar{x} : p(\bar{x}) \leftarrow \phi[\bar{x}]$, where ϕ is an FO(\cdot) formula
- ▶ Structures
 - ▶ Specify factual data over some vocabulary.
 - ↪ Thus, a (partial) interpretation of the symbols in its vocabulary.

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IDP³ main inference tasks

The *model expansion* inference

Given a theory \mathcal{T} and a vocabulary Σ , a partial interpretation \mathcal{I} over Σ and an “output” vocabulary $\Sigma_{\text{out}} \subseteq \Sigma$.

- ▶ Search for interpretation of Σ_{out} such that an extension exists to Σ that also extends \mathcal{I} and is a model of \mathcal{T} .