FORTissa \textit{mo}  

Automating the First-Order Theory of Rewriting

Franziska Rapp

PhD project supervised by Prof. Dr. Aart Middeldorp

**Property**
- arbitrary first-order formula over rewrite relations as predicates
  - E.g. $\forall s \exists t (s \rightarrow^* t \land \neg \exists u (t \rightarrow u))$

**Goals**
- Formalizing underlying theory [1]
- Improving expressiveness of FORT [2]
  - combinations of TRSs
  - witness generation
- Improving performance of FORT
  - formula normalization
  - parallel programming techniques

**Synthesis mode**
- **input**: property
- **output**: TRS satisfying the given property
- options to restrict infinite search space

**FORT**

**Restriction**
- left-linear right-ground TRSs
- decidable theory

**Formalization**

**IsaFoR**

- generate certifier
- formalize results from literature

**CeTA**

- check
  - accept
  - reject
  - unsupported

**Tree automata**

- Complement
- Intersection
- Union

**Ground tree transducers (GTTs)**

- $f(x,a)$
- $g(g(b))$

**RR\textsubscript{n} relations**

- Transitive Closure
- Translation to RR\textsubscript{n}

- Permutation
- Projection
- Cylindrification

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The theory of ground rewrite systems is decidable.  

Automating the First-Order Theory of Left-Linear Right-Ground Term Rewrite Systems.  