Solving Proximity Constraints

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Motivation

For proving theorems, a frequently occurring problem is to find common instances of formulae.

Example 1

Let f be a function, a, b constants and x a variable. The two expressions

$$f(a, x) \quad \text{and} \quad f(a, b)$$

can be unified with $\{x \mapsto b\}$.

Motivation

For proving theorems, a frequently occurring problem is to find common instances of formulae.

Example 2

Let f, g be functions, a, b constants and x a variable. The two expressions

$$f(a, x) \quad \text{and} \quad g(a, b)$$

cannot be unified as $f \neq g$.

Motivation

In 1965 Robinson presented his unification algorithm and solved this problem, his algorithm was improved for better(=faster) performance since.

If we consider now the unification problem

$$f(a, x) \simeq^? g(a, b)$$

again, we might wonder, if we could not ignore $f \neq g$, if they are "close" to each other, i.e. if they are equal in a fuzzy logic sense. Being close is represented as a proximity relation, which are symmetric and reflexive, but not necessarily transitive. C. Pau and T. Kutsia solved this problem, presenting an algorithm, which we implemented.

Introduction

4 sets:

- P: unification problem to be solved
- C: neighborhood constraint
- σ: set of pre-unifier
- ψ: name-class mapping

Pre-Unification rules

(Tri) Trivial: . . .
(Dec) Decomposition: . . .
. . .

Rules for Neigborhood Constraints

(FFS) Function Symbols: ...
(NFS) Name vs Function Symbol: ...
...

Simple example

Problem to solve: $p(x, y) =?q(f(a), g(b))$

Solution: ...

Steps Pre-Unification

. . .

Steps Constraint-Simplification

...

1 Theory

2 System Model

3 Workflow

System Model

...

1 Theory

2 System Model

3 Workflow

Workflow

...