Type Theory Study Group

Meeting 1

13. 11. 2015

Notes
by Ilan Godik

A judgement is a statement about the world.

A proposition is an object we can study.

Jon: Rather a statement about the mental State of the creating subject.

Danny: A judgement is meaningless until we define it, provide the rules.

Ast: Defines the form.

* Don't need sorts initially.

Sorts example:

- Expr
- Statement

Leaves vs Inner nodes:

num[α] defines an infinite amount of nullary operator, the operators don't take a parameter AST-wise.

num[α] is just the name of the operator.

* Leaves in the book are defined as variables only.

Inner nodes: take a list of parameters. may be empty.

ABT's:

Invented before, (70's) under a different name.

Formalizes variable bindings.

* Many different impl.s for variable binding.

Aliasing problem:

Binding:

$\lambda x.$ {term that may contain x}

'x is meaningless, for documentation purposes.

But when implementing or formalizing, need to worry about collisions.

ABT's encode binding up to α-equivalence.

- De Bruijn indices (read de-brown), Solves the issue easily, get rid of the names entirely, but uncomfortable for humans.

* ABT's frequently implemented using de-Bruijin indices.

Operators that bind variables:

$$\mathrm{lam}\ (x . \underbrace{x}_{\text{can use } x \text{ here.}})$$

$$\lambda x . \underbrace{x}_{\text{can use } x \text{ here.}}$$

"Sorts can be thought as the types of ABTs"

Jon: The reason sorts and types feel similar is that ABTs themselves constitute a kind of type theory.

Induction:

Most of the proofs will go by induction on rules.

Judgement- thinking about something in our brain, then claiming some rules represent it, then go by a mechanical proccess on the rules, and arriving to a result which respect our mental model.

* "All things that this judement defines provide the means for finitely analizing them"

Jon:

Distinguish between infinite proofs in general
- which are fine,

and non-well-founded proofs,
for example, proofs of infinite depth.

Example of proof of infinite breadth:
the "omega rule"