cubical evaluation semantics

Carlo Angiuli Jon Sterling

May 3, 2018

I've been thinking a bit more carefully about the evaluation semantics and the semantic domain. What I think we want to do is take a term and an environment and return a family of values (indexed in restrictions); but crucially, I think it is important that the environment be a vector of *values* and not of value-families. By studying carefully the case for instantiating closures (where the rubber meets the road for variables), I think it becomes clear that this is the right way.

To interpret a variable, we just project from the environment and ignore the restriction. I think the way that we had been thinking of doing it would result in the restriction from inside the closure infecting the argument.

Colors: terms, value families, values, restrictions.

$$
\begin{aligned}
[\![(\lambda\{M\})]\!]_\rho &= [\phi]\ \lambda\langle M, \rho, \phi\rangle \\
[\![(\Pi\ A\ \{B\})]\!]_\rho &= [\phi]\ \Pi\Big(\phi^*[\![A]\!]_\rho, \langle B, \rho, \phi\rangle\Big) \\
[\![(M\ N)]\!]_\rho &= [\![M]\!]_\rho\ @\ [\![N]\!]_\rho \\
[\![x_i]\!]_\rho &= [\_]\ \rho_i
\end{aligned}
$$

$$
F\ @\ G = [\phi]\ \begin{cases}
F[\phi] \equiv \lambda\langle M, \rho, \psi\rangle & \mapsto \quad \phi^*[\![M]\!]_{\rho, G[\phi]}[\psi] \\
F[\phi] \equiv \mathit{neutral} & \mapsto \quad \mathit{neutral} \\
F[\phi] \equiv \mathit{coe} & \mapsto \quad \mathit{coe} \\
F[\phi] \equiv \mathit{hcom} & \mapsto \quad \mathit{hcom}
\end{cases}
$$