Destructing Path Function Products

by Sven Nilsen, 2017

When you have a path[1]:

$$f[g] <=> h$$

$$f : A \to A$$
$$g : A \to B$$
$$h : B \to B$$

The function `g` can also be a tuple of functions applied by duplicating the arguments:

$$f[g \,.\, dup] <=> h$$

$$f : A \to A$$
$$dup : A \to (A, A)$$
$$g : (A \to B, A \to C)$$
$$h : (B, C) \to (B, C)$$

A general structure of this kind can be represented in the asymmetric form `$g_{i \to n}$`[2]:

$$f[g_{i \to n}] <=> h$$

It means that, although the same notation is used, there is a wider interpretation and the usage must be interpreted by “what would logically fit here” when solving a specific problem.

For example, a variable might have more than one sub-type:

$$a : [g_0]\, b_0 \wedge [g_1]\, b_1$$

This is the same as:

$$a : [(g_0, g_1) \,.\, dup]\, (b_0, b_1)$$

References:

[1] "Normal Paths"
Sven Nilsen, 2019
https://github.com/advancedresearch/path_semantics/blob/master/papers-wip/normal-paths.pdf

[2] "Algebraic Notation for Asymmetric Paths"
Sven Nilsen, 2017
https://github.com/advancedresearch/path_semantics/blob/master/papers-wip/algebraic-notation-for-asymmetric-paths.pdf