Lifted Associations

by Sven Nilsen, 2019

In this paper I introduce liften associations to simplify reasoning about the core axiom in path semantics, and show the distinction between formal and informal associations.

Let `c’` be a tautological proposition over `c` such that there exists some member of the equivalence class of `c` which is equal to `c`:

c’ := ∃ x : eqv_class(c) { x == c }

This proposition is equal for every member of the same equivalence class.

(x = y) = (x’ = y’)

One can also say that for any `x`, the proposition represents the truth value of belonging to some class:

x : eqv_class(c)   =   x’

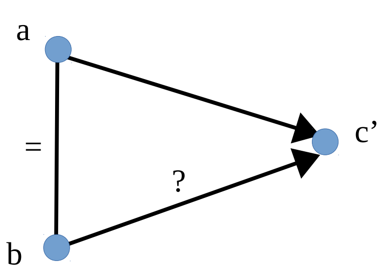
When a collection of symbols `a` is associated with a collection of symbols `c`, one can also “lift” this association to `a` being associated with an equivalence class of collections of symbols to `c’`. Every collection of symbols associated with something can be encoded in Logic with the lifted association:

a → c   a ∧ “→” => c’

Here, `a` is replaced by a proposition of the same name `a`. A new proposition is introduced for every kind of association. When drawing diagrams, instead of drawing arrows for every symbol association `x → y`, one can draw an arrow `x → y’`.

Consider the following problem:

If a collection of symbols `a` is associated with an equivalence class of collection of symbols `c’`, and `a` is equal to `b`, does the core axiom of path semantics[1] imply that `b` is also associated with `c’`?



The answer is no. The missing assumption is that `a > c`. It might be that `b` is associated with `c`, but you can not *prove* that that `b` is associated with `c`. You can only prove this if `a` and `c` are associated *formally*. When you can not prove this, the association is *informal*.

References:

[1] "Path Semantics"
Sven Nilsen, 2016-2019
https://github.com/advancedresearch/path_semantics/blob/master/papers-wip/path-semantics.pdf