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Hypervirtual double categories

We introduce the notion of hypervirtual double category, which generalises that of virtual double category by allowing cells with empty horizontal target (i.e. a single object), rather than a horizontal arrow. We then describe some advantages of studying formal category theory using hypervirtual double categories.

They allow us, for instance, to capture the “right” notion of density for enriched yoneda embeddings, while the corresponding notions in a yoneda structure [1] or good yoneda structure [2] are too weak or too strong respectively. As a second example, any hypervirtual double category comes with an “inbuilt” notion of smallness for its objects; this allows us to generalise results concerning size-conditions.

As a first application, in [3] hypervirtual double categories are used to generalise the theory of Day’s convolution product to other algebraic structures described by 2-monads.

REFERENCES:

- [1] R. Street and R. Walters, Yoneda structures on 2-categories, *Journal of Algebra* 50 (1978) 350–379.
- [2] M. Weber, Yoneda structures from 2-toposes, *Applied Categorical Structures* 15 (2007) 259–323.
- [3] S. R. Koudenburg, A double dimensional approach to formal category theory, arXiv preprint.