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Hierarchical coordinatization from a categorical perspective

Mathematically, hierarchical coordinatization is embedding a structure into an iterated wreath product of simpler structures. For transformation semigroups this is known as the Krohn-Rhodes Theorem and for groups as the Kaloujnine-Krasner embeddings.

In computational implementations we try to avoid constructing the often immensely huge wreath product. Cascade products are substructures of wreath products built by using functions explicitly encoding the connections between the components. Therefore, with them we can construct any hierarchical extension efficiently.

In this talk, after reviewing existing wreath product constructions for categories we investigate how cascade products can be expressed categorically and also reflect on how category theory can provide the most general description of computational hierarchical coordinatization.