

Geometry and Topology

Schedules in concurrency and configuration spaces

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Higher Dimensional Automata (HDA) are topological models for concurrent computation in the form of cubical complexes with a built-in direction. A schedule gives rise to a directed path (d-path), and d-homotopies (preserving the directions) of such d-paths leave the results of computations invariant.

I shall describe and discuss several models for the homotopy type of the space of all traces (schedules up to reparametrization) for simple HDA: as a prodsimplicial complex – with products of simplices as building blocks – and then as a configuration space living in a product of simplices. In favourable cases, it is possible to give an explicit description of the homotopy type of the Alexander dual of such a configuration space and hence of the stable homotopy type of the corresponding trace space. This opens up for calculations of homology groups and of other topological invariants of some trace spaces.

This is joint work with Roy Meshulam (Haifa) and Krzysztof Ziemiański (Warsaw).