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Lusternik-Schnirelmann theory for orbifolds as Lie groupoids

We propose a new numerical invariant for Lie groupoids which generalizes the Lusternik-Schnirelmann category of topological spaces. This number is invariant under Morita equivalence, then yields a well defined *LS*-category for orbifolds.

An orbifold map is given by an equivalence class of generalized maps between Lie groupoids [3]. These generalized maps are obtained by formally inverting essential equivalences. We develop a notion of Morita homotopy between generalized maps and prove that the *LS*-category of a Lie groupoid is a homotopy invariant. We describe a bicategory of fractions where our notion of Morita homotopy equivalence amounts to isomorphism of objects and defines the orbifold homotopy type. Estimates for the *LS*-category of an orbifold relate to other numerical invariants such as Euler characteristic of a category [2] and groupoid cardinality [1].

References:

[1] John Baez and James Dolan, *From Finite Sets to Feynman Diagrams, in Mathematics unlimited-2001 and beyond*, Springer, Berlin (2001) 29–50.

[2] Tom Leinster, *The Euler characteristic of a category*, arXiv:math.CT/0610260 (2006)

[3] Ieke Moerdijk, *Orbifolds as groupoids, in Orbifolds in mathematics and physics*. Contemp. Math. 310, Amer. Math. Soc., Providence, RI, (2002) 205–222.

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