Review of: "Representations of Lie Groupoids on Bundles"

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Potential competing interests: No potential competing interests to declare.

The basic idea of a groupoid is based on a binary operation that is not defined everywhere. A typical example is composition of functions, which is possible only when domains and ranges match. Indeed, in a groupoid, this is abstracted by saying that two elements could be multiplied only when the range of the first element is the source of the second. An example is the path groupoid of a directed graph. Groupoids are not necessarily discrete structures. They could have continuous or even smooth operations, called respectively topological and Lie groupoids.

The representation theory of groupoids is much more involved compared to that of groups. Groups are represented by unitary operators on a single Hilbert space. For groupoids, one needs a bundle of Hilbert spaces: an element of a groupoid is represented by a Hilbert space isomorphism (i.e., a surjective linear isometry) from a Hilbert space indexed by its source to one indexed by its range. The paper under review defines representations of Lie groupoids and gives some illustrative examples.