

Duality theory for Boolean right restriction semigroups

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We generalize the duality between Boolean right restriction monoids and ample source-etale topological categories by Cockett and Garner to the non-unital and locally compact setting. Our approach stems from the widely known construction of the tight groupoid of an inverse semigroup as the groupoid of germs. Elements of a supported Boolean right restriction semigroup are represented by right compact slices of their attached right ample categories. In these categories, the domain map is a local homeomorphism, but the range map is not open in general, and thus does not give rise to a unary range operation in the associated right restriction semigroup. In the special case where the range map of the right ample category is open, the associated right restriction semigroup has the additional structure of a left Ehresmann semigroup. Specializing further to the case where the range map is a local homeomorphism, the category has the additional property that every compact right slice is a finite join of compact two-sided slices. On the algebraic side, this brings Boolean right restriction Ehresmann semigroups with the extra property that every element is a finite join of deterministic elements. These semigroups are a natural generalization of Garner's groupoidal right restriction monoids.