

Seminar on Semigroups, Automata and Languages

Morita equivalence of finite semigroups

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Abstract: Classical Morita theory was first developed for rings with identity by Kiiti Morita. Since then Morita equivalence has been studied for a large number of different structures: rings without identity, C^* -algebras, monoids, semigroups, quantales, categoriies etc. Usually Morita equivalence is defined by requiring the equivalence of categories of "modules" of certain type over structures under consideration.

Two semigroups are called Morita equivalent if the categories of firm right acts over them are equivalent. A right act A over a semigroup S is called firm if the canonical mapping from the tensor product of A an S to A is bijective. In this talk we concentrate on Morita equivalence of finite semigroups.

It turns out that if n is any natural number then every semigroup is Morita equivalent to its subsemigroup consisting of all products of n elements. Using this we can show that a finite semigroup is Morita equivalent to its largest factorisable subsemigroup. (Factorisability of a semigroup means that every element can be written as a product of two elements.) It follows that two finite semigroups are Morita equivalent if and only if their Cauchy completions are equivalent categories. Since these categories are finite, the problem of Morita equivalence of finite semigroups is decidable.

The talk is based on joint research with Ülo Reimaa and Lauri Tart.

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