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William DeMeo (University of South Carolina), Ralph Freese (University of Hawaii)

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Testing for certain idempotent Maltsev conditions

by
Matt Valeriote
McMaster University
Coauthors: Maria Campanella and Sean Conley

As a case study, I will discuss a project that my students, Maria Campanella and Sean Conley, worked on over the past year. The aim of the project was to investigate how near unanimity terms are preserved under direct products, and more generally, Maltsev products. It has been known for some time (and is not difficult to see) that if idempotent algebras A and B have near unanimity terms of arities n and m respectively, then their product will have a near unanimity term of arity nm.

Using UACalc and the UACalc java library, we performed some computer searches on the space of small idempotent algebras having low arity near unanimity terms. Based on the results of this search we were led to conjecture that in the product, one could always find a near unanimity term of arity n+m-1. Along the way to proving this conjecture, we refined some existing polynomial time algorithms for testing for near unanimity terms and produced and implemented related polynomial time algorithms.

This work is based on earlier work of Freese and McKenzie on robustness and of Freese and Valeriote, and Horowitz on the complexity of some Maltsev conditions.

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