AN ONLINE DATABASE OF CLASSES OF ALGEBRAIC STRUCTURES

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Abstract. Over the course of the previous century, many different types of algebraic structures have been investigated. While much effort has concentrated on the so-called classical structures (groups, rings, fields, vector spaces, modules, lattices, etc.) there has also been a proliferation of other algebraic structures that have been defined and analyzed. Some of them are generalizations or specializations of classical structures, while others are motivated by algebraic versions of logics, or by topology, combinatorics, and computer science. With so many different algebraic structures, it is not a simple task to determine how they are related, and what is currently known about them. General theories like Universal Algebra and Category Theory have done much to provide a useful framework for these investigations.

This talk presents a preliminary version of a database that aims to collect basic facts about classes of algebraic structures and their relationships. While there are several handbooks of algebra and online encyclopedia of mathematics, the aim of this database is to provide an overview of the structures that have appeared in the literature together with links to computational tools that can be used to investigate the structures further. Each database entry for a class of structures has, at minimum, a name, (several equivalent) definition(s), some standard examples, a list of basic properties that hold for all members, and a list of its "nearest" sub- and superclasses. If there are feasible algorithms for deciding syntactic properties of the structures, implementations of such algorithms may be linked to the database, as well as enumerations of some finite members (if any). Most classes are categories in a natural way, and concepts from category theory are used to express structure preserving relationships between different classes. Currently the database contains over a hundred classes from *abelian groups* to *weakly representable relation algebras*.

Recent advances in electronic publishing (MathML, XML style sheet transformation, scalable vector graphics) provide the tools for this project, and will also be discussed briefly. Much work still remains to be done, and if it is successful, this effort will not conclude at some future date, but rather continue to evolve in a collaborative style to ensure that the information is useful and up-to-date.

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