A LITTLE BIT INFINITE?
ON ADDING DATA TO FINITELY LABELLED STRUCTURES
(ABSTRACT)

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Finite or infinite strings or trees with labels from a finite alphabet play an important role in computer science. They can be used to model many interesting objects including system runs in Automated Verification and XML documents in Database Theory. They allow the application of formal tools like logical formulas to specify properties and automata for their implementation. In this framework, many reasoning tasks that are undecidable for general computational models can be solved algorithmically, sometimes even efficiently.

Nevertheless, the use of finitely labelled structures usually requires an early abstraction from the *real* data. For example, theoretical research on XML processing very often concentrates on the document structure (including labels) but ignores attribute or text values. While this abstraction has led to many interesting results, some aspects like key or other integrity constraints can not be adequately handled.

In Automated Verification of software systems or communication protocols, infinite domains occur even more naturally, e.g., induced by program data, recursion, time, communication or by unbounded numbers of concurrent processes. Usually one approximates infinite domains by finite ones in a very early abstraction step.

An alternative approach that has been investigated in recent years is to extend strings and trees by (a limited amount of) data and to use logical languages with a restricted expressive power concerning this data. As an example, in the most simple setting, formulas can only test equality of data values. The driving goal is to identify logical languages and corresponding automata models which are strong enough to describe interesting properties of data-enhanced structures while keeping decidability or even feasibility of automatic reasoning.

The talk gives a basic introduction into data-enhanced finitely labelled structures, presents examples of their use, and highlights recent decidability and complexity results.