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MI, 07. 03. 2007, 16.00 Uhr
SE 2 / BWZ

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Discovering errors in concurrent programs through a new ACO model

Abstract: Ant Colony Optimization (ACO) has been successfully applied to those combinatorial optimization problems which can be translated into a graph exploration. The existing ACO algorithms are suitable when the graph is not very large (thousands of nodes) but is not useful when the graph size can be a challenge for the computer memory and cannot be completely generated or stored on it. ACOhg is a new ACO model that outperforms the difficulties found when working with a huge construction graph. In this talk we describe this novel ACO model and we show some experimental results that can help to understand the meaning of the new parameters introduced and to decide which parameterization is more suitable for a given problem. We explain how ACOhg has been applied to the problem of finding safety property violations in concurrent programs using a model checking approach. This problem has a capital importance in Software Engineering and, in particular, in the development of software for critical systems. ACOhg obtains very promising results in this problem, outperforming the results of traditional exhaustive algorithms used for this task in the literature.