Testing and Checking of Finite State Systems
Invited Talk

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Finite state machines have been used to model a wide variety of systems, including sequential circuits, communication protocols, and other types of reactive systems, i.e., systems that interact with their environment. In testing problems we are given a system, which we may test by providing inputs and observing the outputs produced. The goal is to design test sequences so that we can deduce desired information about the given system under test, such as whether it implements correctly a given specification machine (conformance testing), or whether it satisfies given requirement properties (black-box checking).

In this talk we will review some of the theory and algorithms on basic testing problems for systems modeled by different types of finite state machines. Conformance testing of deterministic machines has been investigated for a long time; we will discuss various efficient methods. Testing of nondeterministic and probabilistic machines is related to games with incomplete information and to partially observable Markov decisions processes.

The verification of properties for finite state systems with a known structure (i.e., "white box" checking) is known as the model-checking problem, and has been thoroughly studied for many years, yielding a rich theory, algorithms and tools. Black-box checking, i.e., the verification of properties for systems with an unknown structure, combines elements from model checking, conformance testing and learning.

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