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GENERATING OPTIMAL DISTINGUISHING SEQUENCES FOR TESTING TIMED PROTOCOLS

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ABSTRACT

Testing of a new communication protocol was always a basic requirement for its acceptance and implementation. The use of automata for the modeling of protocols allows for usage of pre-developed testing algorithms for this basic data structure. With timing being a major factor in many communication protocols, automata theory was quick to evolve to accommodate for this edition. New and extended test generation methods using timed automata were developed. Within the context of state identification, most methods, however, keyed their algorithms towards transformation of a timed automaton into a regular, un-timed one; thus, avoiding the need of redefining well known test generation algorithms. In this paper we wish to demonstrate that as far as the well known distinguishing sequence problem (state verification), it is preferable to adapt the standard algorithm to meet the special needs of a timed automaton, sidestepping a costly transformation. We propose a new method of generating a timed-distinguishing sequence, which allows direct testing of a timed IUT (Implementation Under Test) modeled by a timed automaton. An example is used to show the semantics of the algorithm.

Keywords: Distinguishing sequence, state identification, timed automata, protocol testing

1. Introduction

Motivated mainly by automata theory, the field of program testing was heavily studied many years ago. Kohavi's book [15] gives a good exposition of the major results. During the 80's the topic mostly died down, only to come up again due to its application in the field of communication protocol testing. The abundant and diverse research in the area motivated many algorithms and methods that attempted to optimize the testing procedure (status messages [8], separating family of sequences, distinguishing sequences [11], UIO sequences [1, 23], characterizing sequences [9, 15, 20], and identifying sequences [15]). A survey of the main methods can be found in [19] and [6].