Test methods for Score-Based Interactive Music Systems
Toward a formal Specification
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How be sure of a Score-Based Interactive Music System’s behavior during shows?

Ensuring a “guarantee” on the behavior of a complex real-time system is not trivial and requires formal method. Today, Antescofo’s behavior is “manually” checked by the composer during rehearsals. Since rehearsal performances represent just a few set of all possible interpretations of a score, this method is not rigorous.

Manual piece preparation

Compiling Score into Intermediate Representation

Model Based Test Generation

Models of groups with “loose” synchronization strategy

Models of groups with “tight” synchronization strategy

Translating into standard formal models (i.e Timed Automata used by the Uppaal verification suite for real-time systems)

The Intermediate Representation is a step toward a formal specification of Antescofo’s expected behavior. It is a model of how Antescofo’s reactive engine should compute its timed output for every input (i.e. musician performances). IR can be represented with Extended Timed Input/Output Labelled Systems. Each system starting at its s₀, s₁ state and waits on an edge δᵣ for a fire of δ of the symbol δ. IR is able to specify multi-clocks, concurrences, dynamic variables...

Existing tools for testing real-time systems, with an automatic test cases generation, are based on the model of network timed automaton (TA). IR are translated into TA straightforwardly, at the privilege of expressiveness loss. A set of artificial musician performances is automatically generated, with a cover guaranty (i.e quality of tests). The conformance of real traces to the formal model allows us to increase the guarantee on the stability of Antescofo at execution time.