History-determinism is a weak form of determinism for automata which has been introduced some 10-15 years ago in order to extend things which could previously only be done with deterministic models to some form of non-determinism. For example, history-deterministic finite automata can be exponentially more distinct than deterministic ones, and history-deterministic pushdown automata are more general than deterministic pushdown automata but retain some of their good properties.

History-deterministic timed automata were introduced very recently, where it is shown that for example language inclusion, which is decidable for deterministic timed automata but undecidable for non-deterministic ones, is decidable (in exponential time) for history-deterministic timed automata.

The purpose of this project is to better understand the boundary between deterministic, history-deterministic and non-deterministic timed automata. For example, it is known that some types of history-deterministic timed automata are determinizable, but other types are not. It is also not known whether it is generally decidable whether a timed automaton is history-deterministic.

An important tool for history-determinism are certain types of two-player games, so-called letter games and token games. We believe that similar timed games should be available for characterizing history-deterministic timed automata; checking whether this is true will be one of the first venues to explore in the project.

References


