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A survey on temporal logics for specifying and verifying real-time systems. (English)

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Summary: Over the last two decades, there has been an extensive study of logical formalisms on specifying and verifying real-time systems. Temporal logics have been an important research subject within this direction. Although numerous logics have been introduced for formal specification of real-time and complex systems, an up to date survey of these logics does not exist in the literature. In this paper we analyse various temporal formalisms introduced for specification, including propositional/first-order linear temporal logics, branching temporal logics, interval temporal logics, real-time temporal logics and probabilistic temporal logics. We give decidability, axiomatizability, expressiveness, model checking results for each logic analysed. We also provide a comparison of features of the temporal logics discussed.

MSC:

68Q60 Specification and verification (program logics, model checking, etc.)

03B44 Temporal logic

Keywords:

propositional temporal logics; first-order linear temporal logics; branching temporal logics; interval temporal logics; real-time temporal logics; probabilistic temporal logics; decidability; model checking; expressiveness

Software:

DCVALID; ICS ; IDLVALID; Isabelle; Kronos; Modechart; Uppaal

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