A computational logic model for the description, analysis and verification of global and open societies of heterogeneous computees.

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Results in Brief

A priori verification of web services

Recent advances in logic programming have opened up the possibility of easily designing complex web service protocols from simpler ones, by eliminating difficulties arising due to different platforms and languages.

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Web service composition promises to considerably reduce development time and costs, by taking components off-the-shelf and joining them in a working application. Although very appealing, it leaves questions open, such as correctness of the composition or even interoperability of the web services.

Stemming from previous experience in Multi-Agents Systems (MAS), a formal framework has been introduced for the automatic verification of the compliance of web services to common rules and specifications. The society constraint IFF (SC-IFF) framework, developed within the European project SOCS, can be applied to situations involving reasoning with incomplete information and dynamic occurrence of events.

SC-IFF includes proof-procedures to check, a priori and on-the-fly, the compliance of agents with multi-agent protocols, in addition to a language based on abductive and constraint logic programming. More specifically, the compliance of individual web services to Internet Protocol (IP) definitions and Agent Communication Language (ACL) semantics is verified on the basis of the current history of events.

A variant of SC-IFF, called gSC-IFF, provides for the generation of a history of events, compliant to a specific protocol, besides verifying whether a history is compliant with a protocol. Furthermore, the histories generated by the gSC-IFF proof procedure are not only a collection of events, but they can contain variables and represent classes of event histories.

gSC-IFF has been proven sound, which means that the histories it generates are guaranteed to be compliant with the agent interaction protocols, while entailing the user's goals. By generating positive and negative expectations, the protocols' compliance can be dynamically checked while these are being designed. More importantly, its ability to prove the properties of the protocols themselves makes gSC-IFF a valuable tool for protocol engineering.

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