

Coalition-based cooperation between intelligent agents for a contextual recognition of interdatabase dependencies

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Abstract

A novel approach towards the recognition of interdatabase dependencies using a federative agent system FCSI is presented ([4],[5]). The architecture of the FCSI is designed as a set of coalition-based cooperative, intelligent information agents each of them uniquely assigned to one autonomous local database system. The FCSI aims for a cooperative solution for the problem of searching for semantically related information while strictly respecting the autonomy requirements of each individual database system. For this purpose first a terminologically represented local domain information model on top of the local conceptual database schema is built at each agent by processing scripts specified by user's intention on externally available semantic aspects or views of some local database schema objects. These objects are then appropriately linked into the local information ontology by the local FCSI agent[5]. Remote terminological classification[6] then serves as a basis for the recognition of 'intentional' (terminological) dependencies between objects of different database schemas with respect to some or all of their sofar intentionally related semantic aspects. Projections on respectively associated aspect valuations at schema and state level then determine an agent-directed, context-based data sharing and result in restricted proposals for interdatabase schema assertions[5]. Utilitarian coalition building among the rational agents of the FCSI is used in order to achieve an individual rational, cooperative search for semantically related data. The decentralized calculation of each agent's utility bases on their local productions resulting from the execution of own and received tasks to find such dependencies between local terminological information models. We currently investigate several homogeneous agents utility functions leading to respectively different coalition types. Concurrent participation in several, different kinds of coalitions enables each agent to determine a more detailed, individually rational assessment of other agents. The method for coalition formation between FCSI agents bases on the decentralized, bilateral coalition formation algorithm in [3]

adapted for the cooperative recognition process within the FCSI. Thus this approach enables the user to discover some intentional relevant data without the need to browse through all available schema structures first without any help. In particular it is even not possible to get access to the local schema or state level before any coalition with other rational agents is fixed. There exists no global information agent[1] or central mediator agent[2]. Terminological representation and corresponding classification enables in particular a formal treatment and automated, local processing. Rational agency of each FCSI agent respects association autonomy of involved local databases. The approach of the FCSI is unique for supporting the recognition of interdatabase dependencies in decentralized, autonomous environments. Ongoing research on the FCSI includes its implementation in IDEAS-1, an agent system development tool for SUN-workstations, further investigations on application-oriented utilitarian coalition building, and possible deduction of uncertain, plausible dependencies.

References

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