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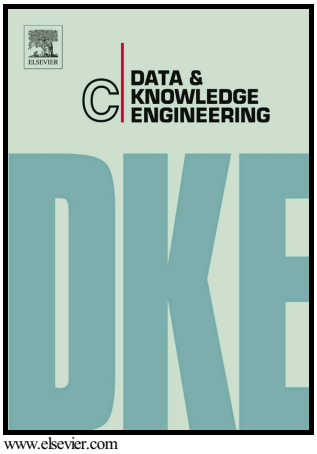

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A knowledge-based system for generating interaction networks from ecological data

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Abstract

Semantic heterogeneity hampers efforts to find, integrate, analyse and interpret ecological data. An application case-study is described, in which the objective was to automate the integration and interpretation of heterogeneous, flower-visiting ecological data. A prototype knowledge-based system is described and evaluated. The system's semantic architecture uses a combination of ontologies and a Bayesian network to represent and reason with qualitative, uncertain ecological data and knowledge. This allows the high-level context and causal knowledge of behavioural interactions between individual plants and insects, and consequent ecological interactions between plant and insect populations, to be discovered. The system automatically assembles ecological interactions into a semantically consistent interaction network (a new design of a useful, traditional domain model). We discuss the contribution of probabilistic reasoning to knowledge discovery, the limitations of knowledge discovery in the application case-study, the impact of the work and the potential to apply the system design to the study of ecological interaction networks in general.

Keywords: Semantic heterogeneity, ontologies, Bayesian network, knowledge discovery, semantic architecture, interaction network, ecological interactions

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