

A knowledge-based system for discovering ecological interactions in biodiversity data-stores of heterogeneous specimen-records: A case-study of flower-visiting ecology

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Abstract

We modeled expert knowledge of arthropod flower-visiting behavioral ecology and represented this in an event-centric domain ontology, which we describe along with the ontology construction process. Two smaller domain ontologies were created to represent expert knowledge of known flower-visiting insect groups and expert knowledge of the flower-visiting behavioral ecology of *Rediviva* bees. Two application ontologies were designed, which, together with the domain ontologies, constituted the ontology framework of a prototype semantic enrichment and mediation system that we designed and implemented to improve semantic interoperability between flower-visiting data-stores. We describe and evaluate the system implementation in a case-study of three flower-visiting data-stores, and we discuss the system's scalability, extension and potential impact. We demonstrate how the system is able to dynamically extract complex ecological interactions from heterogeneous specimen data-stores. The conceptual stance and modeling approach are potentially of general use in representing knowledge of animal behavior and ecological interactions, and in engineering semantic interoperability between data-stores containing behavioral ecology data.