

Seminar

Applied Artificial Intelligence Laboratory

ECE Department

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661 Baldwin Hall - 5 PM to 6 PM

Probabilistic Ontologies

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Abstract

Imprecision and uncertainty are ubiquitous and unavoidable in many domain of human interest. Uncertainty plays a major role in the context of the Semantic Web. The main reason is that Semantic Web applications are expected to handle extensive volumes of data and knowledge accumulated in the current Web with a greater intelligence. This requires capturing the semantics of uncertain data in formal ontologies - conceptual structures that provide necessary background knowledge for the Semantic Web applications. Unfortunately, current methodologies for constructing, representing and reasoning with uncertain ontological knowledge are still far from perfect. In particular, such standardized ontological languages as RDFS and OWL do not provide means for capturing uncertain semantics. This is one of the serious obstacles to the expansion of the Semantic Web.

The talk will reveal and exemplify the necessity of providing formal semantics to uncertain knowledge. The relevant medical problem of breast cancer risk assessment (BRCA) will be used to illustrate the potential benefits of ontological modeling in an uncertain domain. The talk will also present and discuss probabilistic extensions to modern ontological languages, in particular, OWL and its logical bases. Probability is admittedly the best studied and understood theory for representing and reasoning about uncertainty, so it is not surprising that probabilistic semantics was investigated in the context of uncertain ontologies. A prototype implementation of a probabilistic OWL reasoner will be demonstrated and discussed. Finally, it will be shown how the reasoner can be applied to the BRCA and similar problems.