



# **Fakultät für Ingenieurwissenschaften und Informatik**

## **Informatik-Fachvortrag**

**Donnerstag, den 3. Dezember 2009, 16 Uhr c.t.**  
Universität Ulm, Oberer Eselsberg  
Helmholtzstr. 18, Raum 220

**Herr Dr. Kristian Kersting**

Fraunhofer-Institut für Intelligente Analyse- und Informationssysteme IAIS,  
Sankt Augustin

spricht zum Thema

### **Statistical Relational AI**

Much has been achieved in the field of AI, yet much remains to be done if we are to reach the goals we all imagine. One of the key challenges with moving ahead is closing the gap between logical and statistical AI. Logical AI has mainly focused on complex representations, and statistical AI on uncertainty. Intelligent agents, however, must be able to handle both the complexity and the uncertainty of the real world.

Recent years have witnessed several successes in combining probability and (subsets of) first-order logic in the field of statistical relational learning. Nowadays, we can learn probabilistic relational models automatically from millions of inter-related objects. We can generate optimal plans and learn to act optimally in uncertain environments involving millions of objects and relations among them. Exploiting shared factors can speed up message-passing algorithms for relational inference but also for classical propositional inference such as solving SAT problems. We can even perform lifted probabilistic inference avoiding explicit state enumeration by manipulating first-order state representations directly.

In this talk, I survey some of the success stories. Specifically, I will present relational Gaussian processes and lifted probabilistic inference algorithms for computing marginal probabilities from relational probabilistic models. The latter inference approaches are called lifted because they work directly at the level of groups of atoms, eliminating all the instantiations of a set of atoms in a single step, in some cases independently of the number of these instantiations. These contributions advance the theoretical understanding of statistical learning with large models. More importantly, it puts what can be called "Statistical Relational AI" within reach.

Es laden ein die Dozenten der Fakultät für Ingenieurwissenschaften und Informatik.

Ulm, den 10.11.2009

gez. Prof. Dr. G. Palm