Probabilistic Programming and its Applications

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Abstract. Probabilistic programs combine the power of programming languages with that of probabilistic graphical models. There has been a lot of progress in this paradigm over the past twenty years. This talk will introduce probabilistic logic programming languages [1], which are based on Sato’s distribution semantics and which extend probabilistic databases. The key idea is that facts or tuples can be annotated with probabilities that indicate their degree of belief. Together with the rules that encode domain knowledge they induce a set of possible worlds. After an introduction to probabilistic programs, which will cover semantics, inference, and learning, the talk will sketch some emerging applications in knowledge based systems, in cognitive robotics and in answering probability questions. The first is concerned with learning rules in knowledge based systems such as CMU’s Never Ending Language Learning [2], the second with learning probabilistic action definitions and using these for planning to grasp certain objects [3], the final one with the answering of challenging mathematical exercises about probability that are formulated in natural language [4].

References