

1: Introduction to Statistical Relational Learning : Lise Getoor :

Introduction to Statistical Relational Learning Edited by Lise Getoor and Ben Taskar Published by The MIT Press. Handling inherent uncertainty and exploiting compositional structure are fundamental to understanding and designing large-scale systems.

Big Data has been one of the primary reasons for the continued prominence of this relational learning approach given, the voluminous amount of data available now to learn interesting and unknown patterns from data. Moreover, the tools have also improved their processing prowess especially, in terms of scalability. Each of which is inspired by ideas from a different field! After all it is the brain that does all the complex actions for us and, this idea stems from Neuroscience. Another group of Evolutionists whose leader is the late John Holland from the University of Michigan believed it is not the brain but evolution that was precedent and hence the master algorithm to build anything. And using this approach of having the fittest ones program the future they are currently building 3D prints of future robots. Another thought stems from Philosophy where Analogists like Douglas R. Symbolists like Stephen Muggleton Imperial College London think Psychology is the base and by developing Rules in deductive reasoning they built Adam "a robot scientist at the University of Manchester! Bayesians as they are called, are the most fanatical of the lot as they think everything can be represented by the Bayes theorem using hypothesis which can be updated based on new evidence. SRL fits into the last paradigm of Statistics and Logic. As such it offers another alternative to the now booming Deep Learning approach inspired from Neuroscience. Background In many real world scenario and use cases, often the underlying data is assumed to be independent and identically distributed i. However, real world data is not and instead consists of many relationships. SRL as such attempts to represent, model, and learn in the relational domain! MLN is a powerful framework that combines statistics i. Academia Some of the prominent names in academic and the research community in MLN include: His group created the tool called Alchemy which was one of the first, First Order Logic tools. More on it later! Talking about academia close by i. Their group invented the tool " ProbCog At present, Prof. A PGM encodes a joint $p(x,y)$ or conditional $p(y|x)$ probability distribution such that given some observations we are provided with a full probability distribution over all feasible solutions. A PGM helps to encode relationships between a set of random variables. And it achieves this by making use of a graph! These graphs can be either be Directed or Undirected Graphs. It is a Bayesian network and as you can see the central node A highlighted in red is dependent on its parents and parents of descendents moralization by the circle drawn around it. Thus these nodes are the only knowledge needed to predict node A. Image courtesy " Wikipedia C. And now relating it to Markov Blanket as explained previously, a Markov blanket for a node is simply its adjacent nodes! Image courtesy " Wikipedia Intuition We now that Probability handles uncertainty whereas Logic handles complexity. So why not make use of both of them to model relationships in data that is both uncertain and complex. MLN basically provides a template to ground a Markov network. It can be defined as a Log linear model where probability of a world is given by the weighted sum of all true groundings of a formula ϕ under an exponential function. It is then divided by Z which is termed as the partition function and used to normalize and get probability values between 0 and 1. Plus, Formulas may contain one or more predicates, connected to each other with logical connectives and quantified symbols. Evidence Evidence represent known facts e . Each fact is expressed with predicates that contain only constants from their corresponding domains. Weight Learning Discover the importance of relations based on grounded evidence. Inference Query relations, given partial evidence to infer a probabilistic estimate of the world. More on Weight Learning and Inference in the next part of this series! Hope you enjoyed the read. Any feedback as a comment below or through a message are more than welcome! In Machine learning, vol.

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Statistical relational learning builds on ideas from probability theory and statistics to address uncertainty while

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An Introduction to Statistical Relational Learning - Part 1 Statistical Relational Learning (SRL) is an emerging field and one that is taking centre stage in the Data Science age. Big Data has been one of the primary reasons for the continued prominence of this relational learning approach given, the voluminous amount of data available now.

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