SampleSearch: Importance Sampling in presence of Determinism

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**(Work done jointly with Vibhav Gogate)**

Abstract

The talk will describe a new importance sampling scheme over mixed

probabilistic and deterministic graphical models. The use of importance sampling in

such graphical models is problematic because it generates many useless zero weight

samples which are rejected yielding an inefficient sampling process. To address this

*rejection problem*, we propose *SampleSearch* which augments sampling with

systematic constraint-based backtracking search. We characterize the bias introduced

by the combination of search with sampling, and derive a weighting scheme which yields

an unbiased estimate of the desired statistics (e.g. probability of evidence) and when

computing the weights is too complex, we propose an approximation having

a weaker guarantee of asymptotic unbiasedness. An extensive

empirical evaluation on various benchmarks, including on linkage analysis instances, demonstrate the power of this scheme. Subsequently, as time permits we will show how

SampleSearch (as well as any other importance sampling scheme) can exploit

problem decomposition using AND/OR search spaces, yielding new improved statistical measures for various queries.

Bio:

Rina Dechter is a professor of Computer Science at the University of California, Irvine. She received her PhD in Computer Science at UCLA in 1985, a MS degree in Applied Mathematic from the Weizmann Institute and a B.S in Mathematics and Statistics from the Hebrew University, Jerusalem. Her research centers on computational aspects of automated reasoning and knowledge representation including search, constraint processing and probabilistic reasoning.

Professor Dechter is an author of “Constraint Processing” published by Morgan Kaufmann, 2003, has authored over 100 research papers, and has served on the editorial boards of: Artificial Intelligence, the Constraint Journal, Journal of Artificial Intelligence Research, Logical Method in Computer Science (LMCS) and Journal of Automated Reasoning. She was awarded the Presidential Young investigator award in 1991, is a fellow of the American association of Artificial Intelligence, she was a Radcliffe fellow 2005-06 and recently awarded the “Association of Constraint Programming award (ACP 2007) for research excellence.