

Probabilistic Circuits: An Overview

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Abstract. This tutorial presents a view on the tractability and practical usability of probabilistic circuits. They are a class of probabilistic generative models that represent computations explicitly and can be seen as a bridge between interpretative Bayesian networks and high-performing neural networks. We discuss on their relations to other models, including Markov networks, random forests, mixture models, and neural networks. We look at their capabilities for large-scale uncertainty treatment, neuro-symbolic ideas, fairness, and explainability. The talk also illustrates applications using cases in image analysis, multi-typed tabular benchmarks, fairness measures, and data imputation.