

Learning Sum-Product Networks

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The need for SPN

Sum-Product Networks (SPNs) are a type of probabilistic model¹

- ▶ for Probabilistic Graphical Models (PGMs) there exist multi-purpose inference tools
 - ▶ the computational effort scales unproportional to the complexity of the graph
 - ▶ solution: using approximate inference

SPNs represent probability distributions and a corresponding exact inference machine for the represented distribution at the same time

¹H. Poon and P. Domingos, *Sum-Product Network: a New Deep Architecture*, UAI 2011

Representation

Interpretation

- ▶ probabilistic model
- ▶ deep feedforward neural network

Network Polynomials

Arithmetic Circuits

- ▶ SPNs are a special case of ACs
- ▶ Learning Sum-Product Networks with Direct and Indirect Variable Interactions

Inference(s)

Parameter Learning

Structure Learning

SPN Understanding

(SPN-based) Representation Learning

Applications

Code

Open Problems and Future Investigations