ProbTree: A Query-Efficient Representation of Probabilistic Graphs

Silviu Maniu  Reynold Cheng  Pierre Senellart
Query answering on probabilistic graphs

- Graph with independent probabilistic edges
- Reachability, shortest distance \#P-hard
- Monte-Carlo approx. possible, but costly on large graphs
- Main idea: exploit the structure of the graph to build tractable tree decompositions
Query answering on probabilistic graphs

- Graph with independent probabilistic edges
- Reachability, shortest distance \( \#P \)-hard
- Monte-Carlo approx. possible, but costly on large graphs
- Main idea: exploit the structure of the graph to build tractable tree decompositions

Example: decompose the graph into triconnected components
Tree decomposition and retrieval
Query: shortest distance from 1 to 4?
Tree decomposition and retrieval

Query: shortest distance from 1 to 4?
Tree decomposition and retrieval

Query: shortest distance from 1 to 4?

Smaller graph to sample (or compute exactly) from!