Reminder

IAAI presentations next week
Nov. 9, 11, 13
M W F

Previous class
BBN exact inference by enumeration
potentially exponential time

Approximate inference by stochastic simulation
idea: given BBN reconstruct the data (samples)

30 samples out of 478
S = r I = g H = y

Simulate the network N times
to obtain a sample:
sample the root variables

sample for C only the 50-50 distribution,

Entire sample with 4 variables
ask for 0-1

\[ [0, 50, 100] \]
\[ [20, 80] \]
\[ [20] \]
\[ C = t \quad S = f \quad R = t \quad W = t \]

sample from \[ 0.1, 0.9 \]
distribution

sample from \[ <0.8, 0.2> \]

sample from \[ <0.9, 0.1> \]

repeat \( N \) times.

\[ P (R | S = \text{true}) \]

how to compute this probability distribution

\[ \begin{array}{cccc}
C & S & R & W \\
--- & --- & --- & --- \\
t & f & t & t \\
t & f & t & t \\
t & f & t & t \\
\end{array} \]

Take rows which have \( S = \text{true} \)
(discard the others)

\[ \begin{array}{cccc}
C & S & R & W \\
--- & --- & --- & --- \\
t & f & t & t \\
\end{array} \]

\( x \) = number of samples \( R = t \)
\( y \) = number of samples \( R = f \)

\( x < x, y > \)

\[ \text{Rejection sampling} \]

\( \downarrow \) samples that do not agree with the evidence are discarded

100 samples \( \times \) 1000000
Likelihood weighting

\[ p(\mathbf{s}, \mathbf{w}) = \]

\[
\begin{array}{cccccc}
C & S & R & W & t & t \\
\text{t} & \text{t} & \text{t} & \text{t} & \text{t} & \text{t}
\end{array}
\]

\[ w = 1.0 \times 0.9 \times 0.99 \]

\[ w = 1.0 \]

\[ w = \]

\[ \text{This is not a probability} \]

\[ p(C|S,w) \]

\[ x \sim \text{Euc}(s_i, \mathbf{s}) \]

\[ \text{number of samples with } c = \text{t} \]