Bayesian Network

Overview :

Our Bayesian Network file contains a function ‘read_and_solve_query’ which when called reads query file and byesian network file and prints the result of each query.

Observation :

Below is the table which depicts the convergence of the probability given by rejection sampling as we increase the number of samples.

Network used : b3.txt

Query used for observation : q 6 8 11 e 1 2 12

The actual answer by variable elimination is : 0.5

Number Of samples	**Probability For Rejection Sampling (100 runs)**		
	Min	**Max**	**Avg**
100	0.36363636	0.64285714	0.5051695
1000	0.4563008	0.5425641	0.4975073
10000	0.4900777	0.5112497	0.4999183
50000	0.4944050	0.504836	0.5002092
100000	0.4967640	0.503696	0.500244

Conclusion :

From the above observation table , we can conclude that as the number of sample increases , the accuracy of probability given by rejection sampling increases. Also, the difference between max and min probability given by rejection sampling decreases.

Answers :

b1.txt q1.txt

Queries	VE	RS(no. of samples = 10000)
q 4 5 e ~1 2 3	0.25	0.2515465574033904
q 4 e ~2 3	0.5	0.49471915506481035
q 4 e 1	0.5	0.5003302311618133
q 5 e 1	0.5	0.4984733281446447
q 1 2 3 4 5 e	0.03125	0.03222
q ~1 ~2 ~4 ~5 e	0.0625	0.06254

b2.txt q2.txt

Queries	VE	RS(no. of samples = 10000)
q 4 5 e ~1 2 3	0.16	0.1648616125150421
q 4 e ~2 3	0.2	0.20906994619523445
q 4 e 1	0.31999999999999995	0.31552277744330726
q 5 e 1	0.6399999999999999	0.6342285204637796
q 1 2 3 4 5 e	0.005120000000000002	0.00531
q ~1 ~2 ~4 ~5 e	0.017280000000000004	0.01722

B3.txt q3.txt

Queries	VE	RS(no. of samples = 10000)
q 4 5 e ~1 2 3	0	0
q 7 e ~2 3 5	0.3	0.29898074745186864
q 4 e 1	0.500025	0.4995664105938645
q 5 e 1	0.9	0.8991685794440194
q 1 2 3 4 5 e	0.44055900000000003	0.43468
q ~1 ~2 ~4 ~5 e	0.0005	0.00044
q 2 4 7 8 9 10 11 13 e 1 3 5 6 12	0	0.0
q 10 e 1 2 ~5 6	1.0	1.0

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