CIS 579: PA - 2 Report

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Below are the tables displaying the results after executing each sampling algorithm 10 times and calculating the average inferred probabilities for all test queries.

Table for Case 1:

Alarm is false, infer Burglary and JohnCalls being true

[<A,f>][B,J]

Num of Samples	Prior Sampling	Rejection	Likelihood Weighting
10	[<b,0.0000><j,0.0300>]</j,0.0300></b,0.0000>	[<b,0.0000><j,0.06710>]</j,0.06710></b,0.0000>	[<b,0.0000><j,0.0600>]</j,0.0600></b,0.0000>
50	[<b,0.0041><j,0.044>]</j,0.044></b,0.0041>	[<b,0.0020><j,0.0581>]</j,0.0581></b,0.0020>	[<b,0.0020><j,0.0360>]</j,0.0360></b,0.0020>
100	[<b,0.0030><j,0.0424>]</j,0.0424></b,0.0030>	[<b,0.0000><j,0.0424>]</j,0.0424></b,0.0000>	[<b,0.0000><j,0.0510>]</j,0.0510></b,0.0000>
200	[<b,0.0000><j,0.0519>]</j,0.0519></b,0.0000>	[<b,0.0005><j,0.0657>]</j,0.0657></b,0.0005>	[<b,0.0050><j,0.0455>]</j,0.0455></b,0.0050>
500	[<b,0.0012><j,0.0509>]</j,0.0509></b,0.0012>	[<b,0.0002><j,0.0471>]</j,0.0471></b,0.0002>	[<b,0.0006><j,0.0551>]</j,0.0551></b,0.0006>
1000	[<b,0.0011><j,0.0511>]</j,0.0511></b,0.0011>	[<b,0.0009><j,0.0508>]</j,0.0508></b,0.0009>	[<b,0.0016><j,0.0497>]</j,0.0497></b,0.0016>
10000	[<b,0.0008><j,0.0497>]</j,0.0497></b,0.0008>	[<b,0.0010><j,0.0504>]</j,0.0504></b,0.0010>	[<b,0.0011><j,0.0511>]</j,0.0511></b,0.0011>
Exact	[<b, 0.00005="" j,="">]</b,>		

Table for Case 2:

JohnCalls is true, Earthquake is false, infer Burglary and MaryCalls being true

[<J,t><E,f>][B,M]

Num Samples	Prior Sampling	Rejection	Likelihood Weighting
10	[<b,0.0000><m,0.1000>]</m,0.1000></b,0.0000>	[<b,0.0000><m,0.0000>]</m,0.0000></b,0.0000>	[<b,0.0000><m,0.0666>]</m,0.0666></b,0.0000>
50	[<b,0.0014><m,0.1666>]</m,0.1666></b,0.0014>	[<b,0.0000><m,0.1583>]</m,0.1583></b,0.0000>	[<b,0.0014><m,0.0865>]</m,0.0865></b,0.0014>
100	[<b,0.0000><m,0.1717>]</m,0.1717></b,0.0000>	[<b,0.0000><m,0.1086>]</m,0.1086></b,0.0000>	[<b,0.0010><m,0.0748>]</m,0.0748></b,0.0010>
200	[<b,0.0000><m,0.1717>]</m,0.1717></b,0.0000>	[<b,0.0000><m,0.1150>]</m,0.1150></b,0.0000>	[<b,0.0004><m,0.1542>]</m,0.1542></b,0.0004>
500	[<b,0.0000><m,0.1182>]</m,0.1182></b,0.0000>	[<b,0.0000><m,0.0963>]</m,0.0963></b,0.0000>	[<b,0.0012><m,0.1127>]</m,0.1127></b,0.0012>
1000	[<b,0.0045><m,0.1126>]</m,0.1126></b,0.0045>	[<b,0.0000><m,0.1258>]</m,0.1258></b,0.0000>	[<b,0.0003><m,0.1037>]</m,0.1037></b,0.0003>
10000	[<b,0.0005><m,0.1180>]</m,0.1180></b,0.0005>	[<b,0.0005><m,0.1061>]</m,0.1061></b,0.0005>	[<b,0.0013><m,0.1162>]</m,0.1162></b,0.0013>
Exact	[<b,m,0.00011>]</b,m,0.00011>		

Table for Case 3:

MaryCalls is true, JohnCalls is false, infer Burglary and Earthquake being true

[<M,t><J,f>][B,E]

Num Samples	Prior Sampling	Rejection	Likelihood Weighting
10	[<b,0.0000><e,0.0000>]</e,0.0000></b,0.0000>	[<b,0.0000><e,0.0000>]</e,0.0000></b,0.0000>	[<b,0.0000><e,0.0000>]</e,0.0000></b,0.0000>
50	[<b,0.0000><e,0.0000>]</e,0.0000></b,0.0000>	[<b,0.0000><e,0.0000>]</e,0.0000></b,0.0000>	[<b,0.0015><e,0.0026>]</e,0.0026></b,0.0015>
100	[<b,0.0000><e,0.0000>]</e,0.0000></b,0.0000>	[<b,0.0000><e,0.0000>]</e,0.0000></b,0.0000>	[<b,0.0000><e,0.0134>]</e,0.0134></b,0.0000>
200	[<b,0.0000><e,0.0000>]</e,0.0000></b,0.0000>	[<b,0.0000><e,0.0000>]</e,0.0000></b,0.0000>	[<b,0.0009><e,0.0271>]</e,0.0271></b,0.0009>
500	[<b,0.0000><e,0.0000>]</e,0.0000></b,0.0000>	[<b,0.0000><e,0.0000>]</e,0.0000></b,0.0000>	[<b,0.0003><e,0.0124>]</e,0.0124></b,0.0003>
1000	[<b,0.0000><e,0.0090>]</e,0.0090></b,0.0000>	[<b,0.0062><e,0.0290>]</e,0.0290></b,0.0062>	[<b,0.0008><e,0.0130>]</e,0.0130></b,0.0008>
10000	[<b,0.0000><e,0.0116>]</e,0.0116></b,0.0000>	[<b,0.0008><e,0.0075>]</e,0.0075></b,0.0008>	[<b,0.0009><e,0.0100>]</e,0.0100></b,0.0009>
Exact	[<b,e,0.00001>]</b,e,0.00001>		

Credits

- 1. Artificial Intelligence: A Modern Approach (4th Edition)
 - Used for the Conditional Probability Table (CPT) diagram and algorithm pseudocodes.
 - \circ Authors: Stuart Russell and Peter Norvig.

2. ChatGPT

• Assisted in crosschecking **Manual calculations** for algorithm probabilities comparision to ensure the accuracy of the results.