**AI Programming Assignment – 3**

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1. **Alarm is false, infer Burglary and JohnCalls being true.**
   1. Query 1: "[<A,f>][B]"

|  |  |  |  |
| --- | --- | --- | --- |
|  | Prior Sampling | Rejection Sampling | Likelihood Weightage |
| 10 | 0 | 0 | 0 |
| 50 | 0 | 0 | 0.00012242149721491098 |
| 100 | 0.1 | 0 | 0 |
| 200 | 0 | 0 | 0.0000301718285636 |
| 500 | 0.2666666 | 0.0 | 0.0000361248474728 |
| 1000 | 0.3 | 0 | 0.0000601758056054 |
| 10000 | 0.3610122154 | 0.000008 | 0.0000493166334266 |
| 1000000 | 0.3743238683960708 | 0.00000606 | 0.000059359891312 |
| Exact | 0.0000601313 | | |

* 1. Query 2: "[<A,f>][J]"

|  |  |  |  |
| --- | --- | --- | --- |
|  | Prior Sampling | Rejection Sampling | Likelihood Weightage |
| 10 | 0.1 | 0.04 | 0.03 |
| 50 | 0.1 | 0.038 | 0.04399 |
| 100 | 0.25 | 0.44 | 0.610465 |
| 200 | 0.2 | 0.0524999 | 0.041550463 |
| 500 | 0.65 | 0.04659999 | 0.04907304 |
| 1000 | 0.805 | 0.0481999 | 0.0499636008 |
| 10000 | 0.8890193 | 0.04995 | 0.0502028674 |
| Exact | 0.05 | | |

1. **JohnCalls is true, Earthquake is false, infer Burglary and MaryCalls being true.**
   1. Query 1: “[<J,t> <E,f>][B]”

|  |  |  |  |
| --- | --- | --- | --- |
|  | Prior Sampling | Rejection Sampling | Likelihood Weightage |
| 10 | 0 | 0.02 | 0 |
| 50 | 0 | 0.016 | 0 |
| 100 | 0 | 0.009 | 0.015384615384615372 |
| 200 | 0 | 0.021 | 0.01658986175115211 |
| 500 | 0.00021231422505307856 | 0.015799999999999998 | 0.01693142192948466 |
| 1000 | 0 | 0.017400000000000002 | 0.00685061845861078 |
| 10000 | 0.00017887629680586476 | 0.016300000000000002 | 0.014571977178228565 |
| Exact | 0.01643814928511476 | | |

* 1. Query 2: “[<J,t> <E,f>][M]”

|  |  |  |  |
| --- | --- | --- | --- |
|  | Prior Sampling | Rejection Sampling | Likelihood Weightage |
| 10 | 0.02 | 0.02 | 0.02 |
| 50 | 0.0062553191489361695 | 0.032 | 0.040619047619047596 |
| 100 | 0.01588592814859305 | 0.037 | 0.030094017094017066 |
| 200 | 0.013620558855388593 | 0.0375 | 0.021864055299539213 |
| 500 | 0.009317722516527734 | 0.0318 | 0.04803408966894314 |
| 1000 | 0.0099118867833746 | 0.0314 | 0.04546676632223409 |
| 10000 | 0.010468365529654345 | 0.03295 | 0.0353080978064702 |
| Exact | 0.03331388442761261 | | |

1. **MaryCalls is true and JohnCalls is false, infer Burglary and Earthquake being true.**
   1. Query 1: “[<M,t> <J,f>][B]”

|  |  |  |  |
| --- | --- | --- | --- |
|  | Prior Sampling | Rejection Sampling | Likelihood Weightage |
| 10 | 0 | 0.01 | 0 |
| 50 | 0 | 0.006 | 0.013071895424836593 |
| 100 | 0 | 0.009 | 0.006927263730826335 |
| 200 | 0.0005025125628140704 | 0.006 | 0.0004999999999999989 |
| 500 | 0.0014170106746180266 | 0.0054 | 0.0014370765756518094 |
| 1000 | 0.0012123302088981117 | 0.0012123302088981117 | 0.005177568587453633 |
| 10000 | 0.000949139163791702 | 0.007490000000000001 | 0.006851406626267489 |
| Exact | 0.0068762460734210235 | | |

* 1. Query 2: “[<M,t> <J,f>][E]”

|  |  |  |  |
| --- | --- | --- | --- |
|  | Prior Sampling | Rejection Sampling | Likelihood Weightage |
| 10 | 0 | 0 | 0 |
| 50 | 0.002040816326530612 | 0.004 | 0.001999999999999999 |
| 100 | 0 | 0.011 | 0.015854527461652675 |
| 200 | 0.0035379687753230595 | 0.0055 | 0.004570517725070125 |
| 500 | 0.0028287362196151625 | 0.0064 | 0.0011974846689533254 |
| 1000 | 0.0016146361960645555 | 0.0065 | 0.0073439100662102946 |
| 10000 | 0.0020284391744138123 | 0.00573 | 0.005160122962469187 |
| Exact | 0.005612151520557884 | | |