**Tutorial 9**

**Part 1:**

1. The basic principle being used in the Rejection-Sampling algorithm involves making use of the prior distribution specified for the network to generate samples from and then rejecting those samples that do not match with the evidence. So, for our case the evidence would be ¬l ∧ r.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| d | e | a | b | r | l |  |
| T | F | T | F | F | F | F |
| F | F | T | F | T | F | T |
| F | T | F | T | T | T | F |
| T | F | T | T | T | F | T |
| F | F | F | T | F | F | F |

Summarised from the book, the main problem with using rejection sampling is that it rejects so many samples.

2. Set the weight to 1.0 Sample from P(D) = <0.75, 0.25>, suppose it returns false. Sample from P(E) = <0.95, 0.05> suppose it returns true. Sample from P(A|D = false, E = true) = <0.1, 0.9>, suppose it returns true. Sample from P(B|A = true) = <0.8, 0.2>, suppose it returns true.

L is an evidence variable with value false. Therefore, we set: w ← w × P(L = false|B = true) = 0.1 R is an evidence variable with value True. Therefore, we set: w ← w × P(R = true|B = true) = 0.08 So we obtain a sample [false, true, true, true, false, true] with weight 0.08 under D = false.

**Part 2:**

1a) α is the normalisation factor. P(|) is obtained from the sensor model. P(|) is obtained from the transition model. P(|) is obtained from the current state distribution and is the recursive term.

b) P(|) is obtained from the sensor model. P(|) is the recursive term. P(|) is obtained from the transition model.

2) =

3)

4) Yes, as it has a single state variable and a single evidence variable .

5) Assigning i = 1 for = true, i = 2 for = false, j = 1 for = true and j = 2 for = false. By using = P( = j| = i) we get that, T = =

6) O1 = = .

O2 = = .

7a) .

b) .

c)