

COMP3308 Assignment 2

Bayesian Networks

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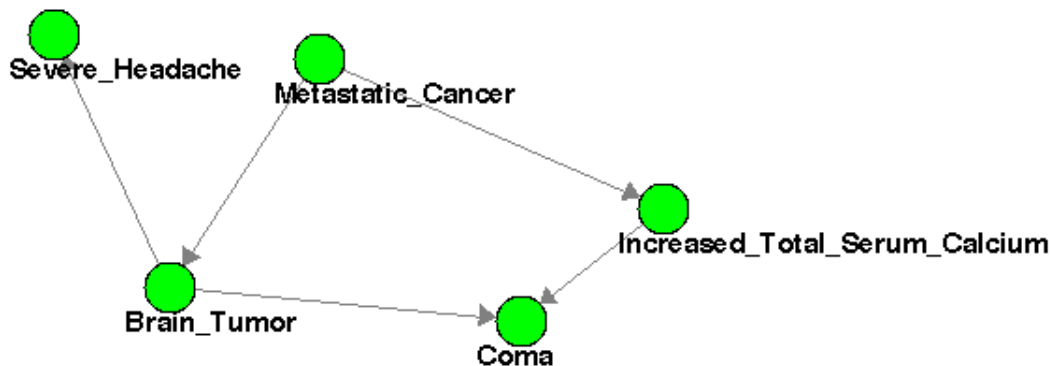


Figure 1: Equivalent graphical model created using JavaBayes

b) What is the prior probability of coma $P(C)$?

```

Posterior distribution :
  probability ( "Coma" ) { //1 variable(s) and 2 values
    table
      0.47435035514892876      // p(true | evidence )
      0.5256496448510712;    // p(false | evidence );
  }

```

Figure 2: Probability of coma query output using JavaBayes

Using the Query function in JavaBayes, $P(C) = 0.47435035514892876$.

c) What is the probability of metastatic cancer given the patient has severe headaches and has not fallen into coma?

```

Posterior distribution :
  probability ( "Metastatic-Cancer" ) { //1 variable(s) and 2 values
    table
      0.0757614259265982      // p(true | evidence )
      0.9242385740734018;    // p(false | evidence );
  }

```

Figure 3: $P(M|S, \neg C)$ query output using JavaBayes

Using the Query function in JavaBayes, $P(M|S, \neg C) = 0.0757614259265982$.

d) What is the Markov blanket of coma?

In a Bayesian network, the Markov blanket of node A includes its parents, children and the other parents of all of its children.

Therefore the Markov blanket of coma are brain tumor and increased total serum calcium.

e) Are increased total serum calcium and brain tumor independent given coma? Explain.

No, because of explaining away otherwise known as Berkson's Paradox.

Normally, total serum calcium and brain tumor are independent, but if we are given coma they become dependent since they share the same child.

f) What is the probability of fallen into coma given the patient has metastatic cancer?

Posterior distribution:

```
probability ( "Coma" ) { //1 variable(s) and 2 values
    table
        0.5040679804736937    // p(true | evidence )
        0.4959320195263062;    // p(false | evidence );
}
```

Figure 4: $P(C|M)$ query output using JavaBayes

Using the Query function in JavaBayes, $P(C|M) = 0.5040679804736937$.

3.2 Question 2

3.3 Question 3

3.4 Question 4

4 Conclusions

5 Reflection

6 Instructions