

572 Lab 3 Report

To construct a Bayesian network for solving the given problem, we can define the following variables:

1. X : Represents the sequence of coin flips.
2. S : Indicates whether Lisa successfully switches from the fair coin to the biased coin.

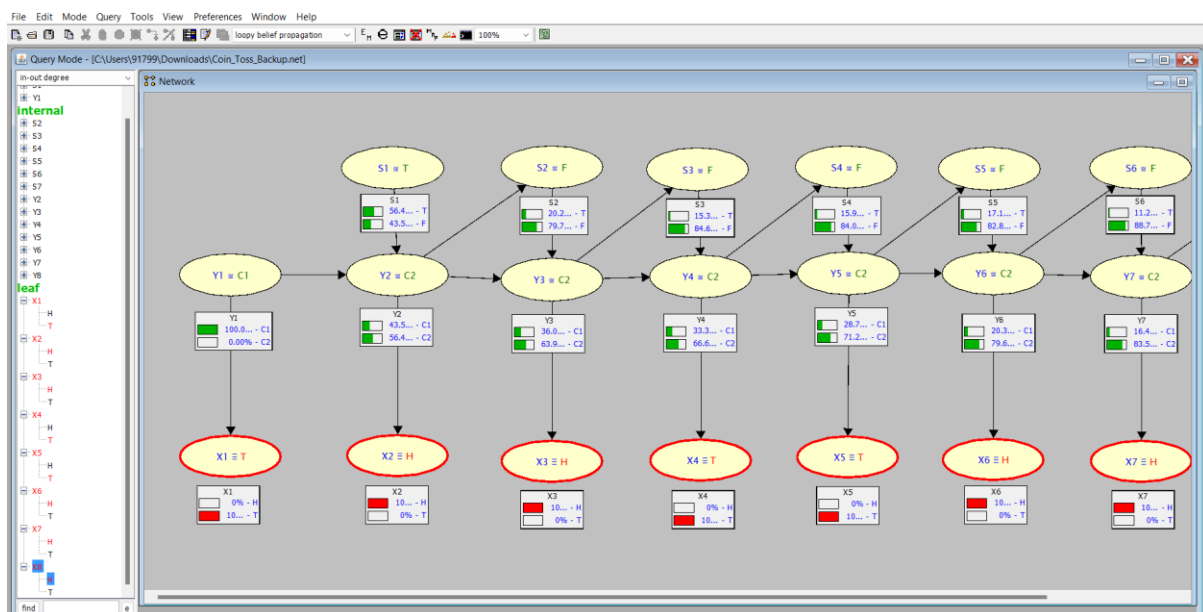
Given that Lisa starts with the fair coin and intends to switch to the biased coin with a 50% success rate per attempt, we can model the dependencies between the variables as follows:

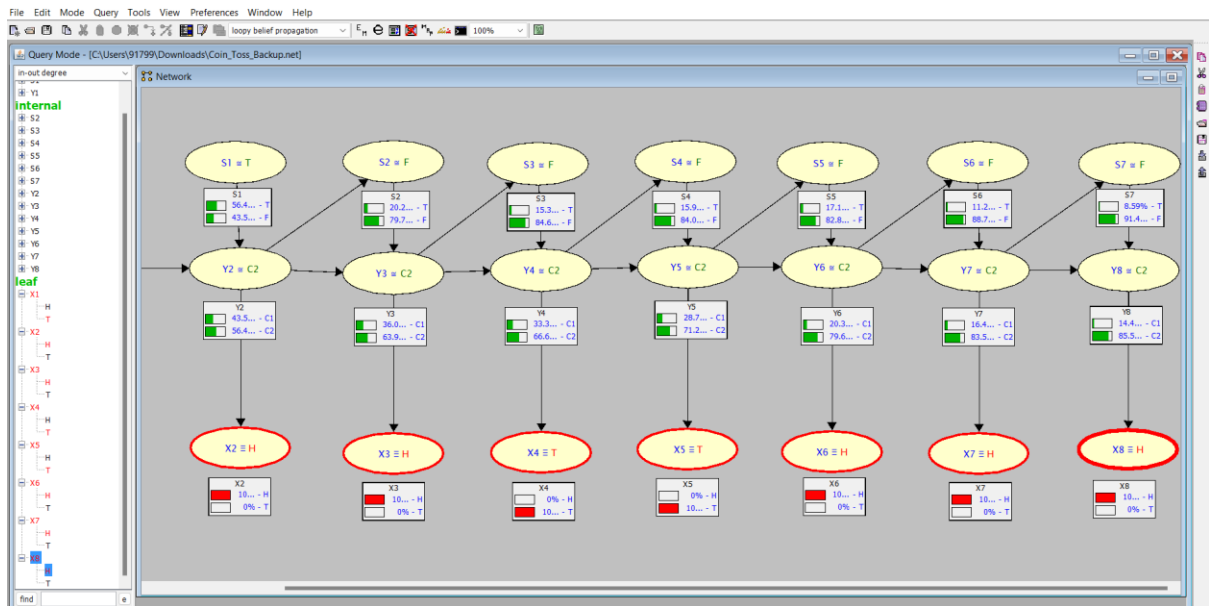
- The initial flip X_1 depends solely on the fair coin C_1 .
- Subsequent flips X_i depend on the coin being used, which could be either C_1 or C_2 , depending on whether Lisa has successfully switched to C_2 .
- The success of Lisa's switch S depends on the previous flip X_i and whether Lisa intended to switch.

Now, let's represent this information in a Bayesian network:

1. Node X_1 represents the outcome of the initial coin flip, with its distribution determined by the fair coin C_1 .
2. Node S represents Lisa's success in switching coins, with its distribution dependent on previous flips and Lisa's intention to switch.
3. Nodes X_2 to X_8 represent the outcomes of subsequent coin flips, with their distributions dependent on both the current coin being used and the previous flip.

Screenshot of Bayesian network with CPTs:



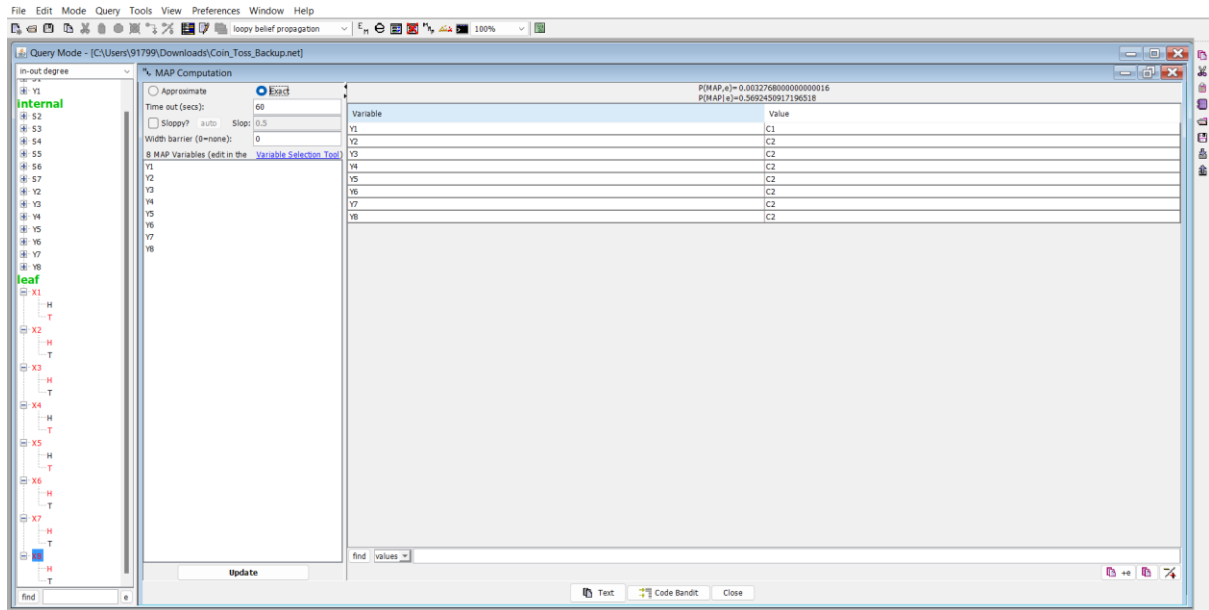


Screenshot of MAP Computation:

The screenshot shows the MAP Computation dialog box in Query Mode. The dialog is titled "MAP Computation" and contains the following sections:

- Search Method:** Taboo Search
- Initialization Method:** Sequential
- Maximum Search Steps:** 25
- MAP Variables (edit in the Variable Selection Tool):** A list of variables including V1, V2, V3, V4, V5, V6, V7, V8, Y1, Y2, Y3, Y4, Y5, Y6, Y7, Y8, X1, X2, X3, X4, X5, X6, X7, X8.
- Results:** A table showing the probability distributions for the selected variables. The table has columns for Variable and Value. The values are: V1: C1, V2: C2, V3: C2, V4: C2, V5: C2, V6: C2, V7: C2, V8: C2.

The bottom of the dialog includes an "Update" button and a "find values" input field.



From the Bayesian network, we have observed that the flip occurs at the second attempt.