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.

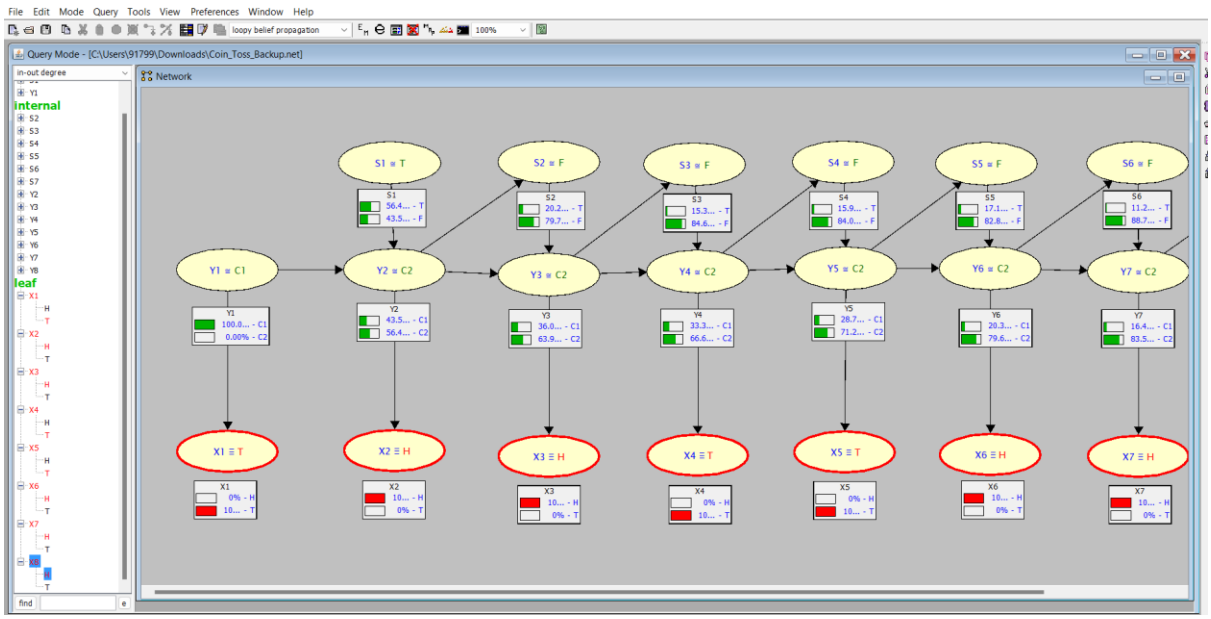
Given that Lisa starts with the fair coin and intends to switch to the biased coin with a 50% success rate per attempt, we can model the dependencies between the variables as follows:

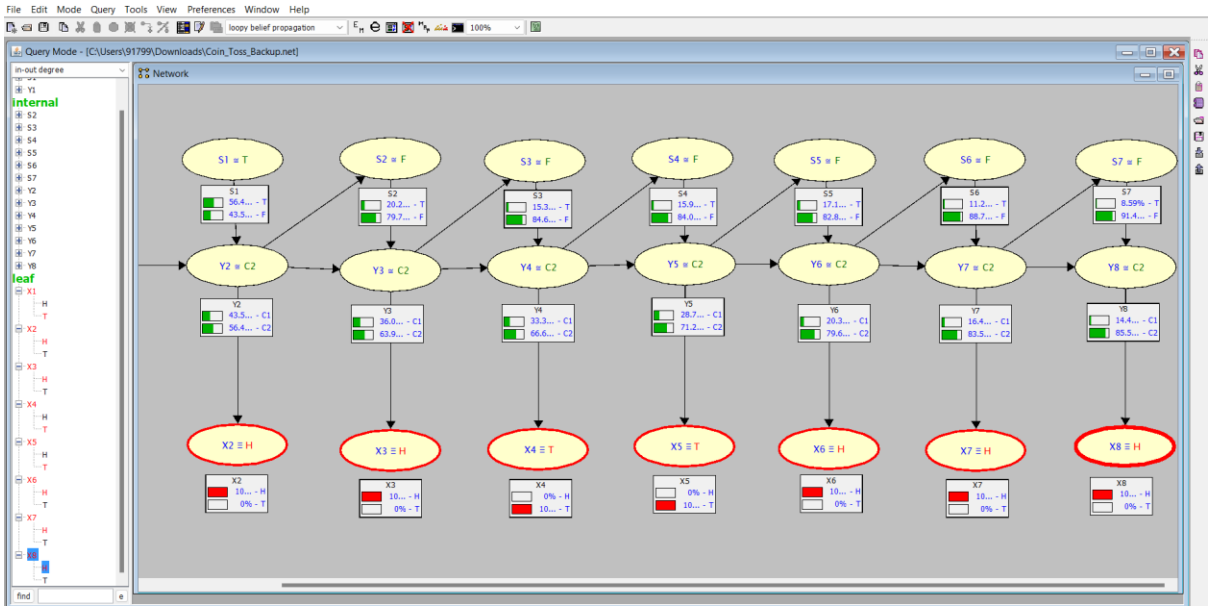
- The initial flip $X1$ depends solely on the fair coin $C1$.
- Subsequent flips Xi depend on the coin being used, which could be either $C1$ or $C2$, depending on whether Lisa has successfully switched to $C2$.
- The success of Lisa's switch S depends on the previous flip Xi and whether Lisa intended to switch.

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

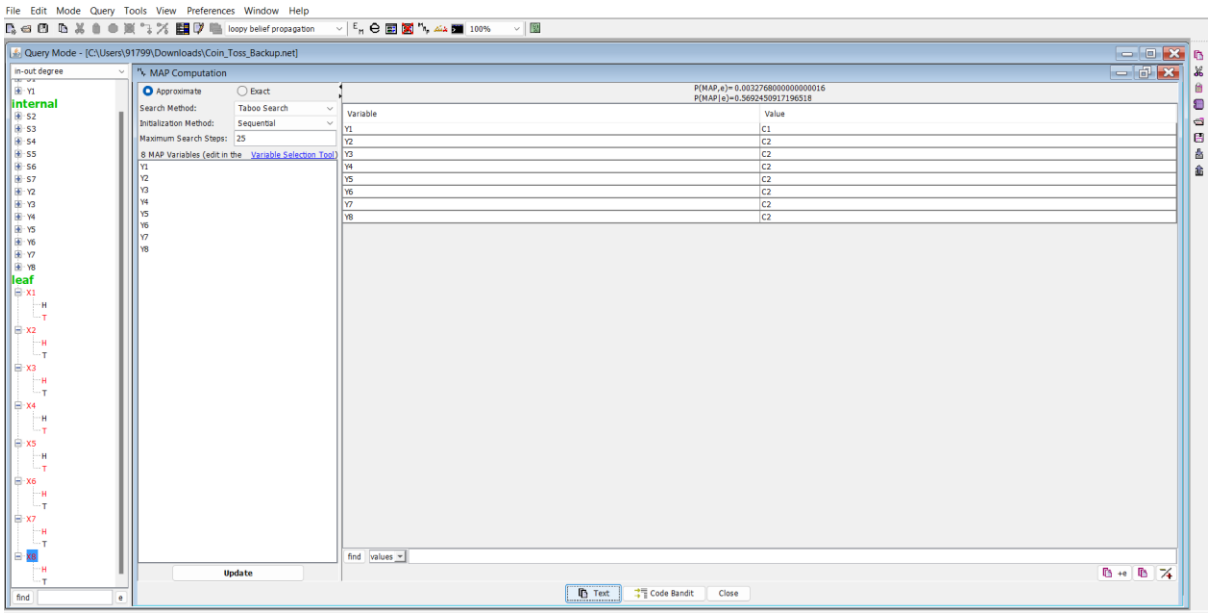
1. Node $X1$ represents the outcome of the initial coin flip, with its distribution determined by the fair coin $C1$.
2. Node S represents Lisa's success in switching coins, with its distribution dependent on previous flips and Lisa's intention to switch.
3. Nodes $X2$ to $X8$ represent the outcomes of subsequent coin flips, with their distributions dependent on both the current coin being used and the previous flip.

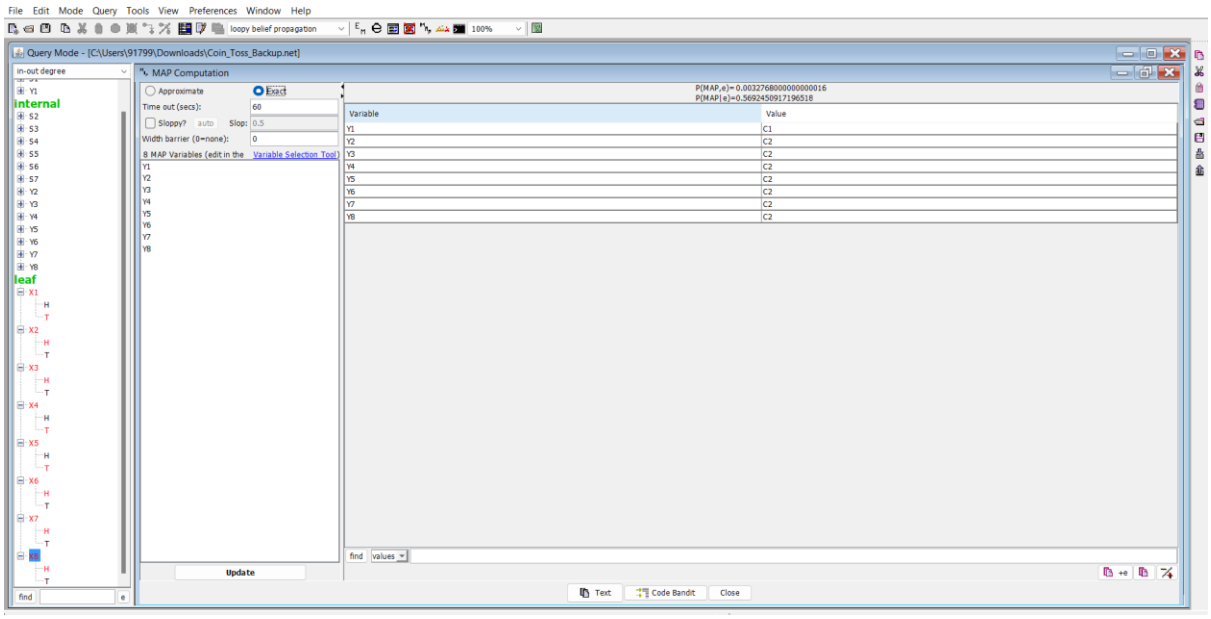
   Screenshot of Bayesian network with CPTs:





Screenshot of MAP Computation:





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