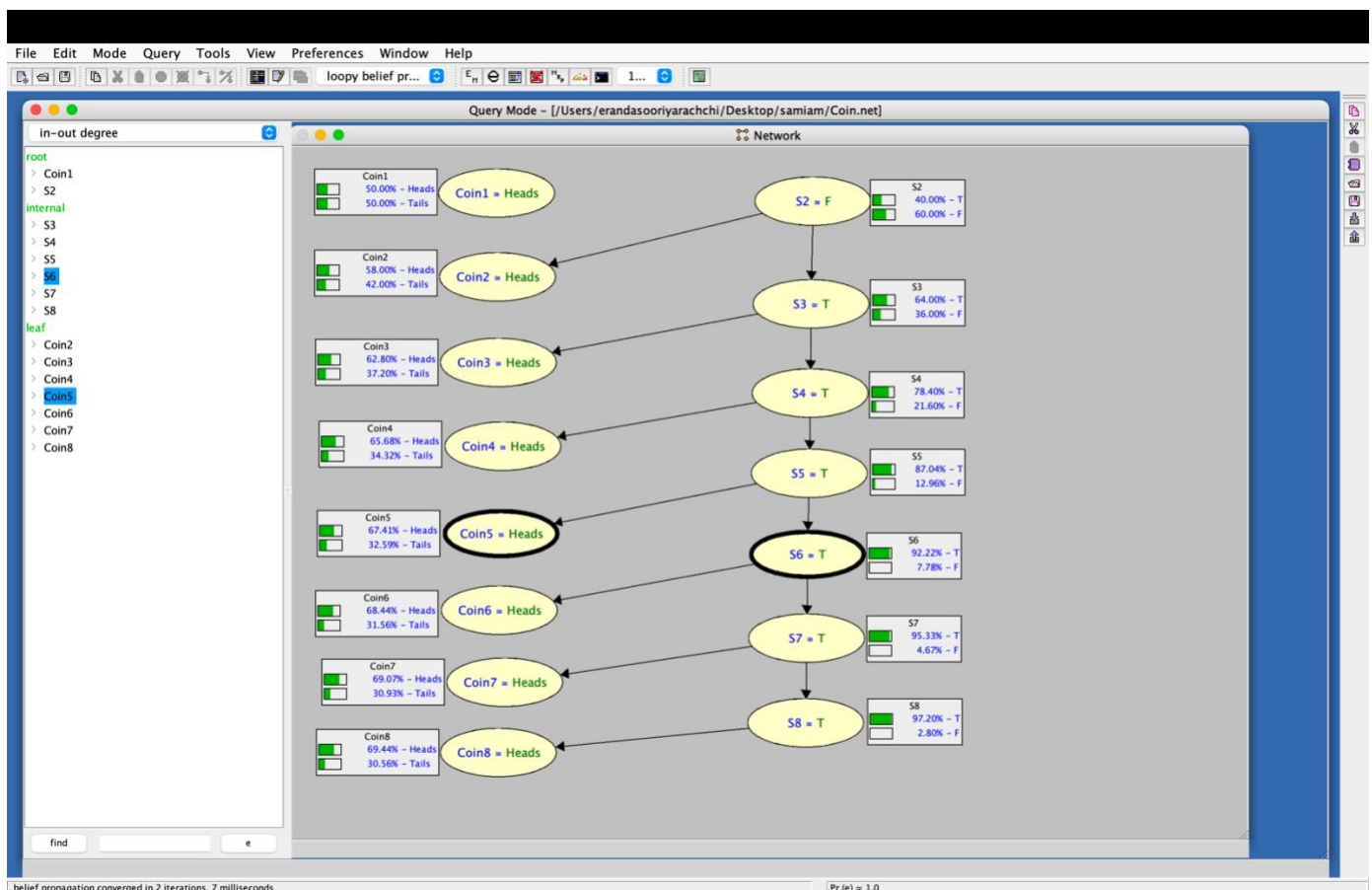


COMS 572
Lab 3
Eranda Sooriyarachchi

In this lab SAMIAM software was used to construct Bayesian network for the following case:

Lisa is given a fair coin C_1 and asked to flip it eight times in a row. Lisa also has a biased coin C_2 with a probability .7 of landing heads. All we know is that Lisa flipped the fair coin initially (the first flip), then she intends to switch to the biased coin, and that she tends to be 40% successful in performing the switch (she will keep using the biased coin if switched successfully). Suppose that the outcome of the eight coin flips are: tail, head, head, tail, head, head, head, head. Has Lisa managed to perform a coin switch? When?

In this case, according to the results from monitor display in query mode shown below, you can see that after the second switch, S_3 , the probability for SWITCH value being true shoots up from 64% to a 78%, this implies that Lisa was able to switch to the biased coin successfully in the 2nd switch, S_3 . Additionally, after S_3 , the probability of coins getting heads has increased above 60%. So this further supports the conclusion that there is a high probability Lisa successfully made the SWITCH at the 2nd SWITCH.



Describe a probabilistic query for solving the problem, and answer the queries using the Bayesian network software tool.

As per the screenshot below, the variable coin 1 was excluded from variables because it is independent of all other variables. Coin2,...,Coin8 and S2,...,S8 was selected as the variables. According Chain Rule and Bayes theorem, this solution can be computed. The MAP tool was used for the computations. The $P(\text{MAP}, e)$ and $P(\text{MAP} | e) = 0.03294172$.

