CS 161 HW 8

Question 1

A constraint on each of the following, which is sufficient to ensure that Pr(D|T) ≥ 0.3: The prior probability of having the disease, the false positive for the test, and the false negative for the test. Screenshot the results from Samlam and attach the pictures in the report.

After constraining the **test result to positive** on the left sidebar and running sensitivity analysis on result (being positive or negative) I get the following constraints to make sure Pr(D | T) >= 0.3

Result	has_disease	no_disease
Positive	0.95 0.994034	0.02 0.002322
Negative	0.05 0.005966	0.98 0.997678

has_disease	0.001 0.008942
no_disease	0.999 0.991058

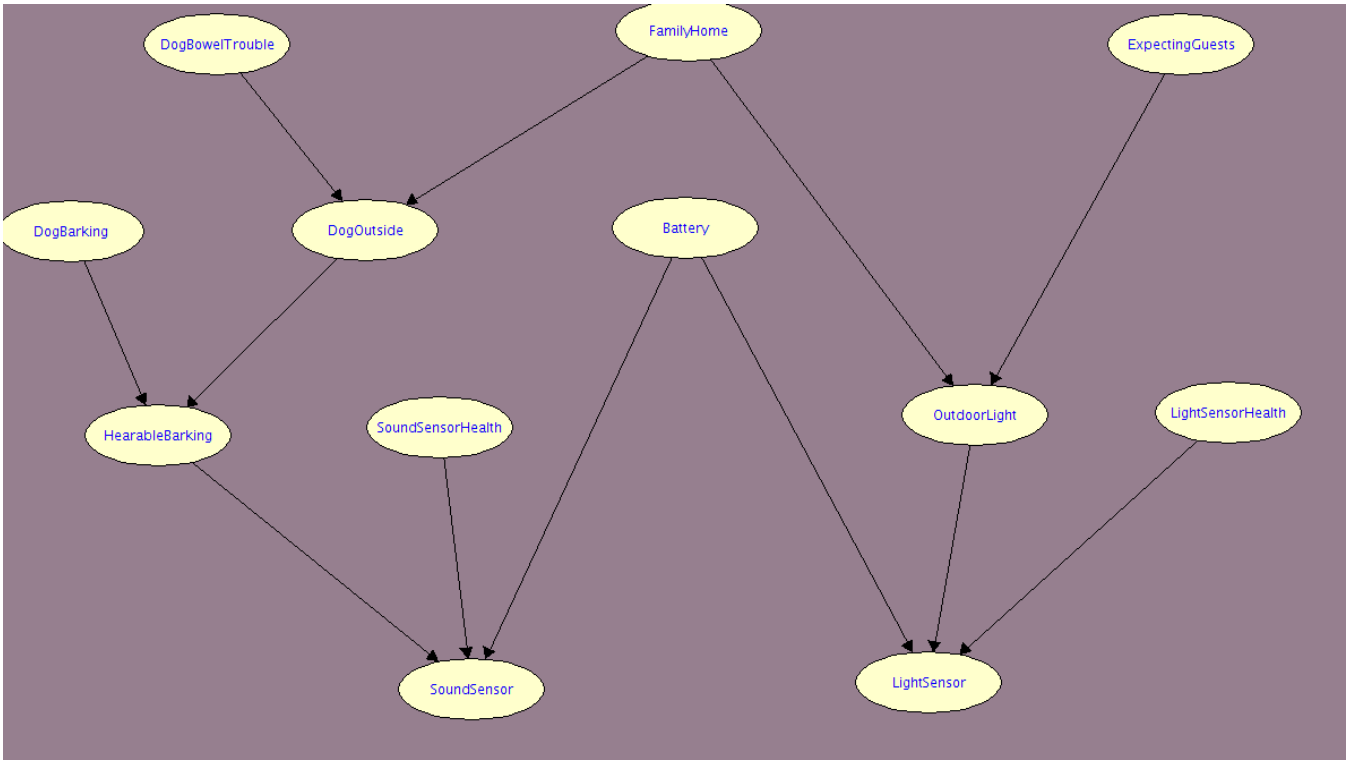
The required values – **1. Pr (having the disease) = 0.008942**

2. Pr (false positive) = 0.002322

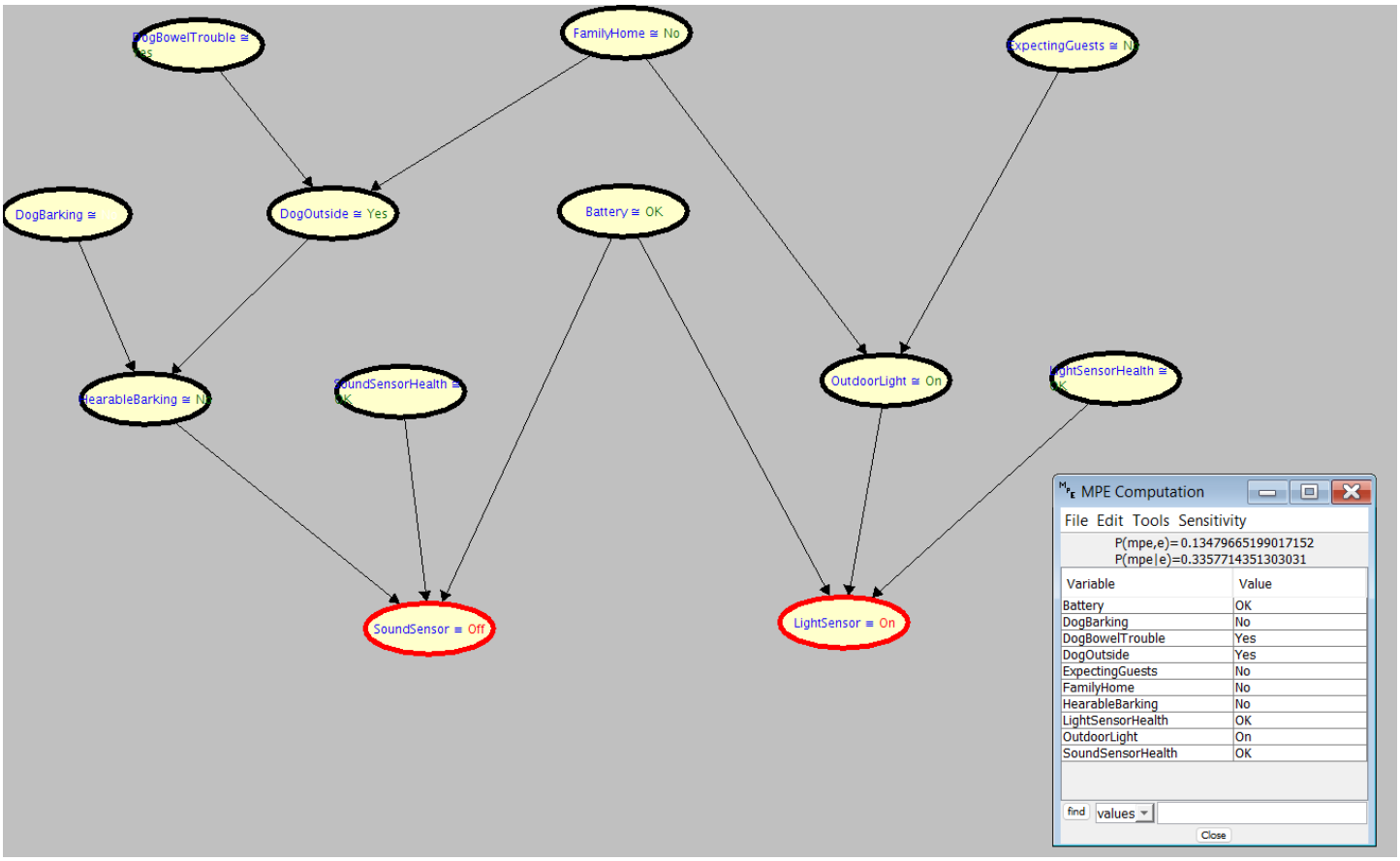
3. Pr (false negative) = 0.005966

Question 2

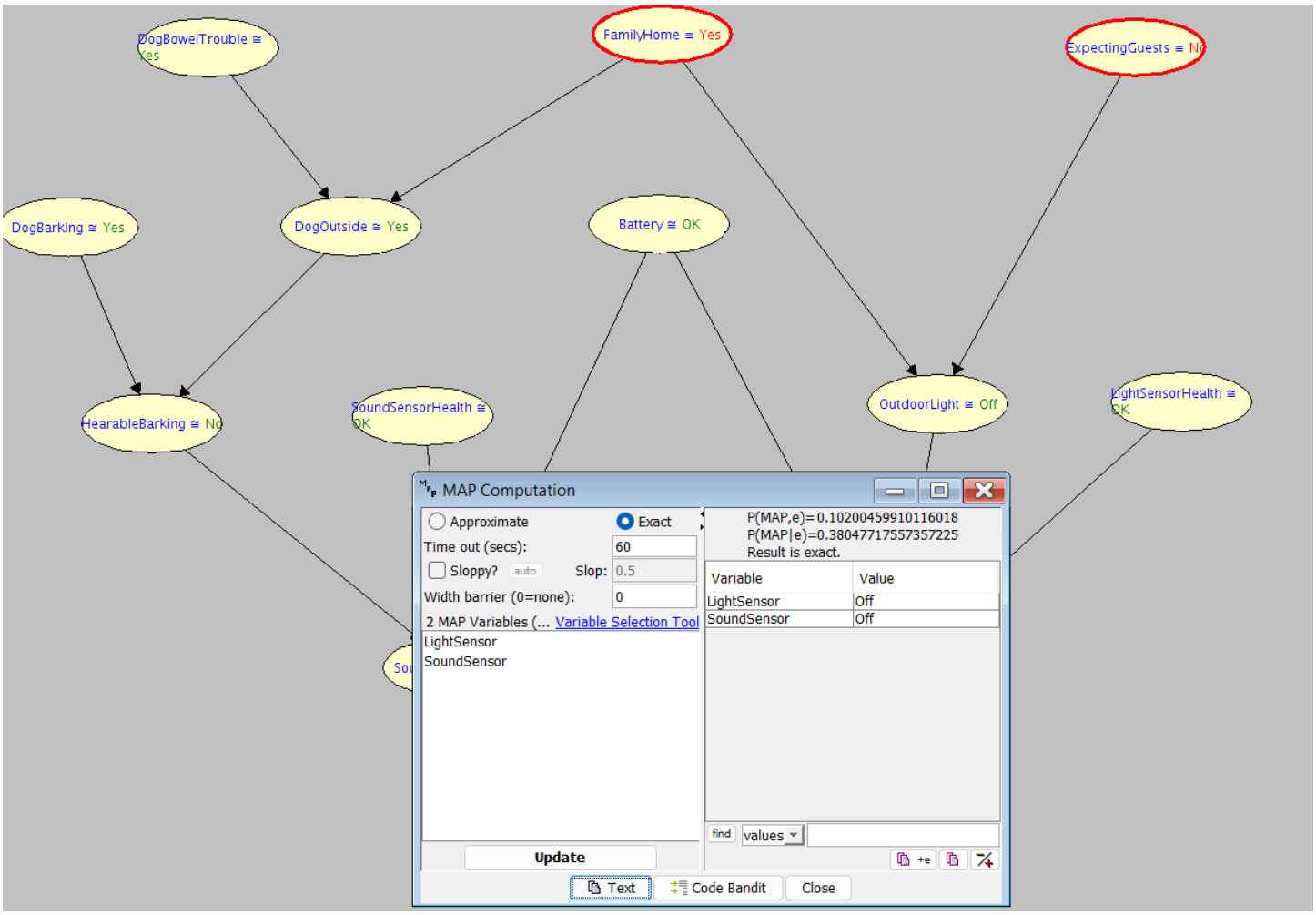
Network Diagram



- The most likely instantiation of all variables given that Sambot has sensed the lights to be on, but has sensed no bark. Explain how you obtained this answer (for partial credit in case you get the wrong answer). Screenshot the results from Samlam and attach the pictures in the report.



- The most likely instantiation of the sensors given that the family is home and no guests are expected. Explain how you obtained this answer (for partial credit in case you get the wrong answer). Screenshot the results from Samlam and attach the pictures in the report.



- The smallest set of variables Z in your network such that the two sensors are independent given Z. Justify your answer based on d-separation.

There are 2 open paths between the two sensors (light and sound) where one is through Battery and other is through HearableBarking, DogOutside, FamilyHome, OutdoorLight, LightSensor. To have the smallest set Z in the network to make the two sensors independent variables, Z could consist of Battery and any one of (HearableBarking, DogOutside, FamilyHome, OutdoorLight, LightSensor). Lets assume Z = (Battery, DogOutside). Therefore, Z would contain two variables which would block all the paths between the sensors making them independent. Thus, proved by d-seperation.

- The type of network you constructed: tree, polytree (singly-connected network), or multiply-connected network.

This is a **multiply-connected network.**