

Lab 3

Reasoning with Bayesian networks

In this assignment, you will use a Bayesian network software to solve a problem.
Note:

- For help with laboratory assignments, please contact TAs.
- You are required to perform the experiments using a Bayesian network software tool. We recommend SamIam (which uses Java), but please feel free to use other packages.
 - The Windows and Mac versions of SamIam are attached. (For Windows 32 bit system, download samiam30 windows i386 release; For Windows 64 bit system, download samiam30 windows amd64.zip.) For online help and downloading other versions including Linux and Solaris, please visit <http://reasoning.cs.ucla.edu/samiam/>. A good place to learn SamIam is <http://reasoning.cs.ucla.edu/samiam/help/>. A tutorial video is attached.

1 The Problem

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?

2 Tasks

1. Construct a Bayesian network for solving the above problem using a Bayesian network software tool (e.g. SamIam). Save the Bayesian network file (e.g. as Coin.net in SamIam).
2. Describe a probabilistic query for solving the problem, and answer the queries using the Bayesian network software tool. (Note: probabilistic queries refer to queries such as $P(X)$, $P(X = True|Y = False)$, specific MAP, MPE queries, etc.)

3 What to turn in

Turn in via Canvas a compressed file (.zip) containing the following:

- A file (e.g. Answer.txt or Answer.pdf) containing queries and answers to the queries.
- The Bayesian network file (e.g. Coin.net in SamIam).