Problem Wk.12.2.1: Stochastic State Machines

This problem is intended to familiarize you with using the models in a Stochastic State Machine. But, first, we'll start with some review of basic distributions.

Part 1: Distributions

Consider a universe with two random variables *Disease* and *Test* that we explored in Software Lab 10. The questions below refer to the Python representations that we worked with in that lab.

1. How do we represent *P(Disease='disease')*?
   ----
   number
   string
   DDist
   procedure
2. How do we represent *P(Disease)*? ----
3. How do we represent *P(Disease='disease', Test = 'posTest')*? ----
4. How do we represent *P(Disease | Test)*? ----
5. How do we represent *P(Disease | Test = 'posTest')*? ----

Part 2: SSM

Let `m` be an instance of the `StochasticStateMachine` class. If `s`, `x` and `y` are states, `i` is an input and `o` is an observation.

1. What is the type of: `m.startDistribution`?
   ----
   number
   string
   DDist
   procedure
   error
2. What is the type of: `m.startDistribution.prob(s)`? ----
3. What is the type of: `m.observationDistribution`? ----
4. What is the type of: `m.observationDistribution(s)`? ----
5. What is the type of: `m.observationDistribution(s).prob(o)`? ----
6. What is the type of: `m.observationDistribution.prob`? ----
7. What is the type of: `m.transitionDistribution(i)`? ----
8. What is the type of: `m.transitionDistribution(i)(y)`? ----
9. What is the type of: `m.transitionDistribution(i)(y).prob(x)`? ----
10. Write a Python expression whose value represents $P(O_t=o \mid S_t=s)$.
11. Write a Python expression whose value represents $P(S_{t+1}=x \mid S_t=y, I_t=i)$.

This problem contains one or more multiple-choice questions. When a given set of choices is used for the first time, all choices are displayed. If there are several related questions, you can assume that the same choices are available for all questions.

6.01SC Introduction to Electrical Engineering and Computer Science

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