

Assignment 1: Simulations of (Bayesian) Affect Control Theory

CS886 – Winter 2017

Due: February 28, 2017

Submit your assignment in PDF only by email to the instructor at jhoey@cs.uwaterloo.ca

Use the email subject line: CS886 Assignment 1 FIRSTNAME LASTNAME

and the PDF file name: CS886-A1-LASTNAME-FIRSTNAME-STUDENTID.pdf

You get **5 pts** (out of a total of **100 pts**) for following the submission instructions exactly!

1. [60 pts] Part I: Doctor Example

In the paper by Jon Gratch and Stacey Marsella¹ we have the following example (copied verbatim):

“In this example, we model the behavior of an oncologist, Dr. Tom. His patient, Jimmy, is an eleven-year-old boy suffering from stage 4 inoperable cancer. Dr. Tom has exhausted all treatment options and the patient is in extreme pain. The agent interacts with a human participant playing the role of Jimmy’s mother. After consulting with a specialist, Dr. Tom concludes the only effective option for controlling Jimmy’s pain is to administer large doses of morphine. Dr. Tom opposes this option, however, as it may hasten Jimmy’s death. [in footnote: Morphine is commonly believed to hasten death by suppressing the respiratory system, though this view is contradicted by some recent studies. What is important is the causal interpretation encodes Dr. Tom’s belief that morphine is harmful, not the actual fact of the matter.] Above all other factors, Dr. Tom values prolonging life, even if the patient is in pain, and especially in someone so young. On the other hand, Jimmy is experiencing intense distress and is fixated on the hope his pain can be reduced. Dr. Tom explains these options to the mother, with the hope that she will decline morphine treatments. If the participant playing Jimmy’s mother elects to proceed with the morphine treatments, Dr. Tom feels anger. In the subsequent discussion, we describe how we can represent Dr. Tom’s interpretation of this situation, the evolution of his emotional state over time, and the impact of coping strategies.”

Do the following steps

(a) Interact simulation

i. Download the interact software from

<http://www.indiana.edu/~socpsy/ACT/interact.htm>

You should click on the link “Download Interact.jar” and get this file:

http://www.indiana.edu/~socpsy/public_files/Interact.jar

ii. You can read about how to do Interact simulations in this document:

http://www.indiana.edu/~socpsy/public_files/InteractGuide.pdf

or you can check out the instructional videos at (“Screencast 2” shows how to use Interact):

<http://cs.uwaterloo.ca/~jhoey/research/bayesact/lectures/>

iii. Tick the boxes in *options* to record the fundamentals and transients and deflections to the console. On the *options* page, also increase the “search cut-off distance” to 10.0

iv. Set up a simulation between a “*doctor*” and a “*patient*”. The gender of the doctor should be male. The gender of the patient should be female, but this doesn’t matter for the questions below as the simulations will be done from the doctor’s (male) perspective.

¹Jonathan Gratch and Stacy Marsella. A domain-independent framework for modeling emotion. *Cognitive Systems Research*, 5(4):269–306, 2004.

- v. Make the first event be “doctor advises patient”
 - vi. Make the second event be “patient ignores doctor”
- (b) Bayesact simulation
- i. Download the Bayesact software from <http://cs.uwaterloo.ca/~jhoey/research/bayesact/>. Make sure you get version 0.5.1 (latest). You should read the README file and you can watch some instructional videos on doing simulations from the page <http://cs.uwaterloo.ca/~jhoey/research/bayesact/lectures/>
 - ii. run bayesactinteractive between a doctor and a patient. Do this with 5000 samples using the following command line:


```
python bayesactinteractive.py -i doctor -j patient -a 2 -n 5000 -k male -l female -m 10.0
```

 Make the “agent” (the doctor in this case) “advise” the “client” (patient), and then the client “ignore” the agent. You can use a `-o` flag to see a simple plot in 2D (E-P) of the distributions as well. Make the behaviours be the same as in the Interact simulation (*advise/ignore*). You should simply hit “enter” when it asks you to input an emotion to display for the client. If you want to play with the effects of an emotional display (for the client), you can reduce the number after the `-m` flag (to e.g. 0.1) and enter something else when asked (e.g. “”).

Answer the following questions

- (a) In the interact simulation, what emotion does the doctor feel after the two events²? Is it different from that predicted by the Gratch&Marsella model? Why or why not?
- (b) In the Bayesact simulation, did the fundamentals, transients and emotions match those of the Interact simulation after each step? Why or why not? Remember that in Interact, the roles of agent and client are swapped on each turn (so client becomes actor when it is client’s turn).³
- (c) The simulation above leaves out Jimmy, the actual patient in this situation. If he is included, there are three pairs of people who are interacting. Explain what identities you would choose for each of these pairs, and what behaviours (events) you would select to model the situation above in Interact. Write a short (200 word) discussion of how this would be done.

What to hand in:

- [20 pts] A table showing the fundamentals and transient outcomes for actor (the doctor), behaviour and object (not setting), as well as the deflection and emotions (for both actors) at each of the two steps for both Interact and Bayesact simulations. You can find the fundamentals, transients, and deflection for Interact in the Java console (if you checked the box under “options”) or by looking in the “view report” screen of the applet. In Bayesact, fundamentals, transients, emotions and deflections are printed to the console. Use the “current deflection (agent’s perspective)” for deflections, and the “agent is feeling” and “agent thinks client is feeling” for actor and object emotions.
- [40 pts] Answers to the questions above - 15pts for each (a) and (b) and 10pts for (c).

2. [35 pts] Part II: Freeform example

Think about a situation that you have encountered recently, or one that you have seen in a movie, book, video game, etc. The situation can be relatively simple (e.g. involving two persons, with one or two interactions). Choose reasonable identities for the two actors in your situation, and run an Interact **OR** a Bayesact simulation (your choice). You should run the simulation for only 2-4 interactions (so each actor acts once or twice). If using Bayesact, you can do simulations where one agent doesn’t know the identity of the other, for example.

What to hand in:

- [10 pts] A table the fundamentals, transients, emotions and deflection at each step of the way for your simulation (Interact or Bayesact).
- [25 pts] Write a short (250 word) discussion describing your simulations.

²Read this on the main “Analyze Events” screen in the “Object emotions” after the patient ignores the doctor

³Also note that the labels may be different because of “concept gates” being applied in Interact. This means, e.g., an emotion may be reported as “feminine” in Bayesact, but this is considered a “trait” and not shown in Interact. Click on “concept gates” in the “Analyze Events” screen in Interact after you select an event to include “traits”.