CS 364 Spring 2013
Homework #2 Solutions
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Honor Code:

Part 1

a) This is right.

$$P(A \text{ exec.} \mid B \text{ not exec.}) = \frac{P(A \text{ exec.})P(B \text{ not exec.} \mid A \text{ exec.})}{P(B \text{ not exec.})} \quad (1)$$

$$= \frac{\frac{1}{3} \cdot 1}{\frac{2}{3}} \quad (2)$$

$$= \frac{1}{2}$$

(1) This is just an application of Bayes' theorem. Now that we know B will live, we can use this to figure out A's probability of being executed.

(2) We know that only one person is being executed, so if A is executed then the probability of B living is 1.

b) This explanation supposes that the probability of A being executed is independent of the probabilities of the other prisoners being executed. This is wrong. What if we had learned that B *was* going to be executed? Then clearly A would be stupid to think that they have a $\frac{1}{3}$ probability of being executed.

Part 2

Part 3

Part 4

Part 5

- Natural-looking facial animations can be used in a variety of contexts, from computer games to studies of speech perception. Xue [1] used Bayesian networks to develop a system for constructing facial animations from audio data. A two-dimensional hidden state space was used to relate the audio and facial data to in order to construct the most likely facial motion for a given sequence of sounds. This allowed the synthesis of facial animations from arbitrary human speech. The resultant animations were fairly accurate. A study was made with sixteen participants, asking them to decide whether a pair of animation and sound matched, or were different. The participants answered correctly around 80% of the time.
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Part 6

[1] Jianxia Xue. "Acoustically-Driven Talking Face Animations Using Dynamic Bayesian Networks." (2008).