CS 481 - Markov's Decisions
Homework 4

Dennis George

6/1/2021

I reached out to Professor Popyack before the assignment was due and asked for an extension, as the due date for this assignment was on Memorial Day. I submitted my tournament entry on Memorial Day though, so it could be a part of the tournament.

1 Hiding Markov

For this exercise, I downloaded the full text of The Great Gatsby in order to perform my calculations. The code that I wrote can be seen in the included file "viterby.py". Below is a table outlining the performance improvements as we increase n.

n	differences between actual and corrected
1	111
2	134

I was interested to see that increasing n caused the viterby algorithm to be less accurate. I believe this is because there are correct changes that are being overwritten when the di-graphs get introduced to the equation. For example, a single letter replacement may be correct, but gets overwritten by a suggestion in the double-letter state. Either way, the algorithm still produced better results, and created some good suggestions.

In order to get this program to work, I had to write an algorithm that would build the proper graph for the given text with n as an input. The graph will include all states from $n - 1$ within itself. For example, the $n = 2$ graph will include all states that appear in $n = 1$. I also had to update the variable *emit_nonzero* for the $n = 2$ case, as we now have more possibilities. An example of this would be if you had *ab* and *b* can be misread as a *d*, then *emit_nonzero* should take account of both *ab* and *ad*. With all of this information, the viterby algorithm was able to run properly.

In order to run, use either:

1. python2 viterby.py 1

2. python2 viterby.py 2

The number that is passed in represents n.

2 Blackjack, Hit me Again

My solutions to part i. and ii. are in the included excel sheet "blackjack.xlsx". All of my calculations were done with MATLAB and excel.

1. Please refer to the P(DEALER) sheet in the submitted file.

2. Please refer to the P(DEALER_FINISHING) sheet in the submitted file

3. Please refer to the P(DEALER_FINISHING) sheet in the submitted file

3   Go Down Gamblin'

Using my final matrix from section 2, it was easy to come up with how my agent would make decisions. For example, the agent should stand on any soft state that is higher than 17, as there is not a high enough chance that they will end up in a better state than where they are now. It is more likely that the dealer busts. Using this logic, I only switched states from stand -¿ hit, when it would be more advantageous for the player. My final submission for this is in the included file "djg365_blackjack.txt"