COGS 300 – Lab 2 – Two pages max (excl. code)

Due:
Monday Lab
   Starts: February 2\textsuperscript{nd}
   Proposal Diagrams: February 9\textsuperscript{th}
   Demo: February 23\textsuperscript{rd}
   Report: March 2\textsuperscript{nd}

Wednesday Lab
   Starts: February 4\textsuperscript{th}
   Proposal Diagrams: February 11\textsuperscript{th}
   Demo: February 25\textsuperscript{th}
   Report: March 4\textsuperscript{th}

Goal:

Design, build, and program a robot that can navigate a maze. NOTE that this robot must \textbf{NOT} use an internal knowledge representation system. This means that your robot must perform just as well in a brand new maze without the need for a change in the code (no hard-coding).

Setup:

You will be allowed to use 1 NXT, up to 3 sensors and 3 motors. Your robot will be placed in a wooden maze with walls. From the initial starting point the robot should navigate the maze until it finds and end point that will be designated by crossing a black line.

Grading:

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Proposal Diagrams

At the beginning of the lab on February 9\textsuperscript{th}/11\textsuperscript{th} each group will submit two proposed solutions for the problem at hand. This proposal should include a diagram that outlines the logic of the steps that your robot will take to complete the problem (at high level, so try not to include steps for each sensor).

Two brief paragraphs should describe each solution, including any assumptions made or problems that
you could run into. A third should describe why you have chosen one solution over another (~100 words each paragraph). (Note, your final solution does not have to match the proposals, but if they differ it should be explained in your report). One mark will be awarded for completion, one mark will be awarded for your solution and descriptions (full marks given to solutions that are distinct and clearly thought through).

Demonstration

Your robot must successfully navigate from one end of the maze to the other by the end of your demo lab date to qualify for full marks. The grading scheme will be time-dependent and relative across the groups in the lab. Observe the following:

Imagine that N is equal to the finishing time of the fastest group in the lab. The marking scheme will be as such:

5/5: A finishing time of N to a finishing time of N + .25N
4/5: A finishing time of N + .25N to a finishing time of N + .5N
3/5: A finishing time of N + .5N to a finishing time of 2N

For example, if the fastest group finishes in 6 minutes, the other groups may receive 5/5 by finishing within 6 to 7.5 minutes. A mark of 4/5 will be given for finishing between 7.5 and 9 minutes, and a mark of 3/5 is given to a finish of less than 12 minutes.

A mark between 0 and 2 is given based on merit if the robot is unable to finish the maze in that time.

Pseudo Code – Flow Chart

Refers to an informal process in which you lay out what your algorithm does in a step by step manner. Your pseudo code should look like a more detailed version of your proposal diagrams, including individual steps. It should allow the reader to walk stepwise through your code. It should be more detailed than your proposal because it will include specific actions and decisions of your robot. See: http://cdn.robotc.net/pdfs/vex/curriculum/Pseudocode%20and%20Flowcharts.pdf for an example.

Commented Code

This should be a copy of your actual code. Ensure that you comment your code thoroughly, explicitly defining all methods, tasks, variables and classes. Do not assume that your algorithms are clear to anyone reading the code for the first time.

Design Process

The first component of your write up is a discussion of your general approach to the assignment. Explain why you built like you did, why your program exhibited the behaviours it did, and which approaches you found successful. Be sure to justify any design decisions made, list any difficulties you encountered, and explain why your particular strategy is the best to handle the task.
**Connections**

The literature/lecture component of your write up should attempt to link what you have learned in the lab with material covered in lecture or assigned readings. Make sure you cite your sources in APA.

This section will be graded on both creativity and quality of the connections made. Think about some of the challenges you encountered while programming your robot. Are any of these similar to existing conundrums in cognitive science today? Did you find any particular technique helpful when trying to get your NXT to complete the task? What does the relevant literature say about this technique? What constitutes intelligent behaviour and did your robot exhibit this? Did completing the lab project help you better understand any topics covered in lecture? What was the topic and how did it contribute?

Students are advised to pick one or two major connections and explore them in depth rather than identifying a large number of connections and discussing them superficially. Make connections and be ready to defend them!

**Style**

We reserve the right to reduce up to 2 marks from overall grade due to error-prone writing that would impede understanding. Make sure to proofread your papers before submitting.