

CS 3850

Foundations Of Artificial Intelligence

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Final Project Report

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Abstract

In this report I will go over our motivation for using the block world problem for our final project and the context in which we are approaching it in this class. I also cover the goal of the block world problem for greater context to what we are trying to solve. I discuss my results from trying to solve the block world problem and the struggles I faced in doing so. Afterwards I cover approach to solving this and the foundation of my reasoning, which I illustrate with a flow chart. Finally, moving into my conclusion I reflect on the outcomes of this project and report .

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Introduction

Motivation

Over the course of this past semester, we have spent time learning foundational topics and concepts within the umbrella of artificial intelligence, now with that limited range of understanding we were tasked with solving the block world problem. The block world problem is a widely used example of for demonstrating these foundational principles.

Goals

Consider a world with a number of block that each have their own label and can be in one of four locations. Three of these locations are stacks of blocks, while the last is an arm which is used for taking actions that will change the state of the block world. Any combination of these blocks is called a state. Our goal is to get a starting state and ending state from the user and with those, construct the intermediate states that results in the output of the ending state.

Organization of Report

After covering why and what we are doing, we will look at how successful I was at planning and executing our block world, afterwards we will go over my reasoning that I took to achieve this and look at flowcharts which show how states are accessed and traversed. Finally, we will go over any conclusions that I arrived to over the course of and through the outcomes of this project.

Results

So, as I said when I did my project demo, I was unsuccessful in creating an algorithm that could traverse from start states to end states. This was disappointing, the task was harder than I expected, and I bogged myself down in structural issues and working so that my representation of states was functional and visually intuitive. Interfering issues came up in every step as I added actions and by the time I was ready to begin building my `do()` and decision functions I was nearly out of time and overwhelmed by what felt like a lack of understanding of what direction I was to go in. Taking the professors advice of not looking to the internet for outside approaches, I went to chapters 11 and 12 from the textbook; Foundations of Artificial Intelligence by Michael R. Genesereth and Nils J. Nilsson, these two chapters cover State and Change and, Planning. These two chapters gave me a direction to go in with what I had built so far, unfortunately my second problem of time had only gotten worse and I did not have enough left to implement my methodology.

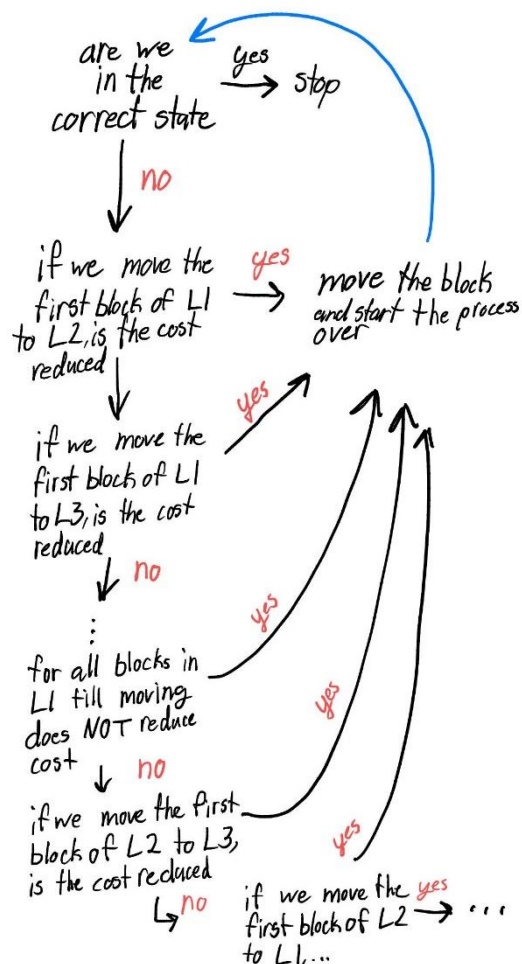
Main Sections

Methodology

For my methodology, I planned my approach around looking at the difference between the starting state and ending state and working to reduce that difference to zero. I call this difference between states cost. The cost of each block is calculated by looking at if the block in the current state is in correct position, if it is not, it has a cost of 2. If the block below it is not the correct block, that has a cost of 1. Lastly if a block is held by the arm, it has a cost of 0. Our goal with this methodology is to reduce cost to zero. With this direction I looked to chapter 12 of the textbook for help with planning.

Flowchart

Again, I kind of ran out of time with this so my logic is obviously a bit incomplete, but I hope this flow chart is enough to show the strategy I was working towards with my logic.



Conclusions

This project was a lot more difficult than I expected it to be and I am really disappointed that I wasn't able to demonstrate a completed block world solution, but I was able to get several steps in what feels like the right direction.

References

Genesereth, M. R., & Nilsson, N. J. (1987). Logical Foundations of Artificial Intelligence.
Morgan Kaufmann.