TDT4171 Artificial Intelligence Methods
Exercise 3

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Abstract

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Introduction

In this exercise we were tasked with creating a decision support system for a decision problem of our own choice. The exercice listed some examples, and one of the examples was exactly a problem I was facing this week: *Should I go out on Friday or stay home doing this exercise?* Next week I had many exercises that were due. I also had plans to go to an event Saturday evening. Therefore I had good reason to stay home. However, as we all know, staying home Friday night doing exercises, while all your friends are out, isn't much fun.

The exercise required that we had to measure the success of our choice. I measured this as the quality of life I would achieve when making this choice. The exercise also required that this decision problem had to contain at least 10 variables, and that half of them would have to be uncertain at the time the decision was made.

The decision problem was modelled in GeNIe, which is a graphical user interface for solving just such a problem. The interface was relatively easy to work with

once I learned how to create nodes and connect them together and adding probabilities.

Model

Once I had chosen what decision problem to model, and my utility function. I followed the steps recommended in Russell and Norvig (2010, pp. 634) to create the model. The first step was to create a causal model. This meant making a dependency graph, with lines between each dependency. I identified the following variables as directly affecting my quality of life:

- Will I finish the exercise in time?
- Did I have a good time Friday night?
- The amount of money I have.
- My physical state (hungover / tired / well rested)

All of these variables are influenced by many other variables. Including all of the variables is not in the scope of this report, but I have included those I found most important:

- Exercise deadline.
- How much of the exercise have i already done (progress).
- Are my friends going out on Friday?
- Did I work this week?
- Did I go out on Thursday?
- Do I have plans on Saturday?
- Will I make those plans?

After adding all those variables and identifying how they relate to each other I ended up with the result shown in Figure 1.

The second step was to simplify and remove variables that did not affect the decision. Because my model was so simple and all variables affected my utility function, I skipped this step.

Next step was to assign probability to each unknown state. Some of these were simple, like whether or not my friends are going out, if I have to work this week and the probability of going out on a Thursday. None of these variables

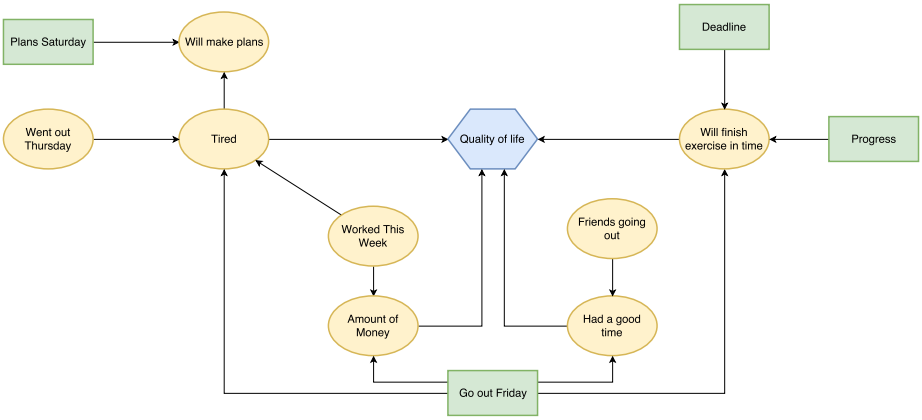

Figure 1: The model of the decision problem. The green rectangles are observable variables. The yellow ellipses are unknown at the time the decision is made, and the blue hexagon is the utility.

depended on other variables, making figuring out the probability as easy as just remembering how often these things happen.

With all the edge variables and decisions added, the more complex variables had to be created. These are also based mostly on empirical evidence. The most complex probability table was the *Will finish exercise in time*, which depended on when the deadline was, how far I had already gotten and whether or not I would go out on Friday. Since both deadline and progress had three values to choose from, making it an 18x2 big probability table. A small piece of it can be seen in Table 1.

Progress	Started		
Go out on Friday	Yes		
Deadline	Two weeks	Next week	Tomorrow
Yes	0.95	0.8	0.05
No	0.05	0.2	0.95

Table 1: Probability of finishing the exercise before deadline

Results

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Discussion

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References

Russell, S. J., & Norvig, P. (2010). *Artificial intelligence: A modern approach* (3rd ed.). Pearson Education.