

## TDT4171 Exercise 3

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# 1 DECISION PROBLEM

In this task I have chosen to consider the decision problem "Where should i go to vacation; skiing or beach?". In Figure 1.1, the resulting model with a random examples of priorities is presented.

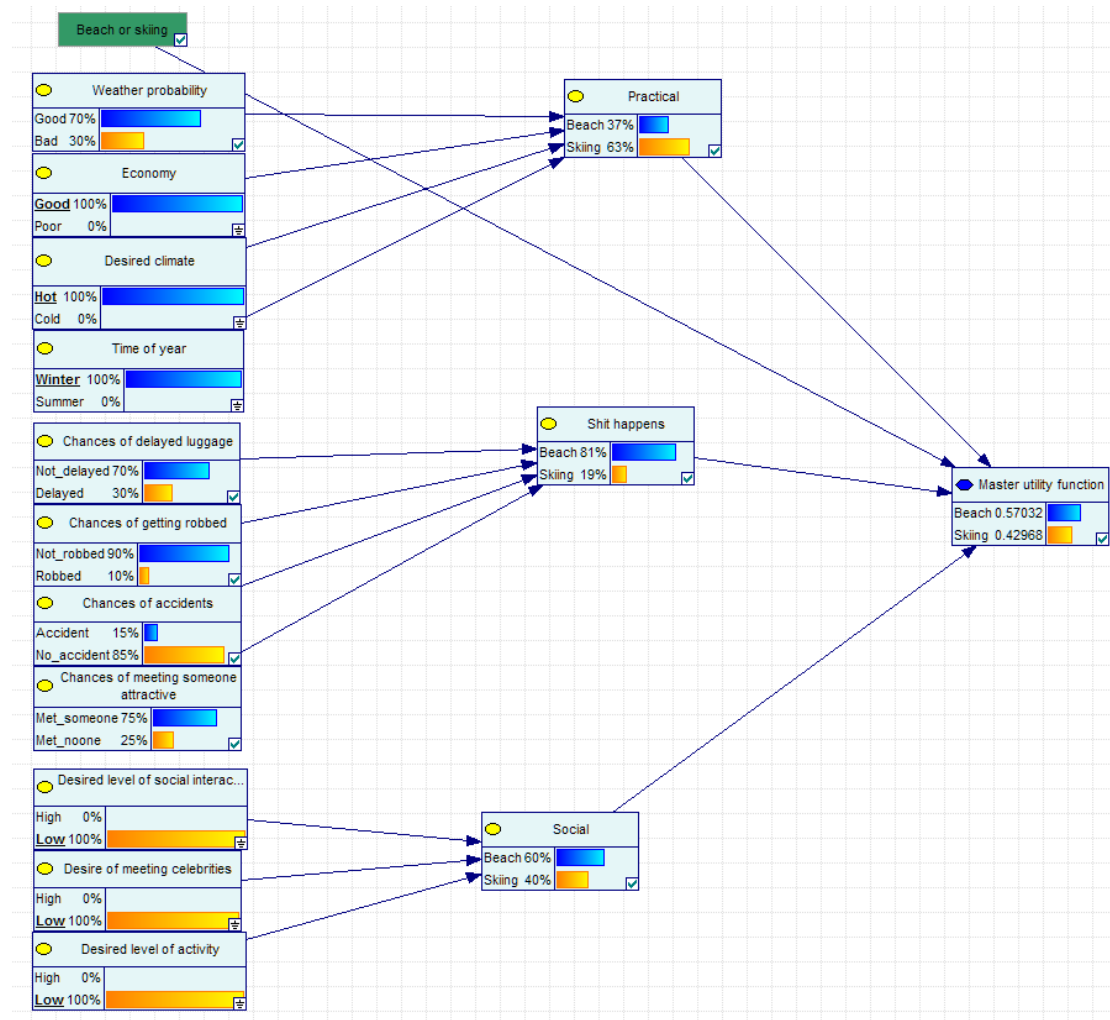


Figure 1.1: Model of the decision problem.

In this model, i have chosen to use 11 different variables, concerning everything from the "users" economy to the chances of getting robbed. Together, these variables form up groups, representing practical, social, and uncertain factors in the decision. The uncertain variables (weather, delayed luggage, getting robbed, accidents and meeting someone) were quantified using probabilities. As it is the modeling of the decision problem that is of importance here, these probabilities does not necessarily represent an accurate, real-world value, as I have not put down too much work in researching the probability of lost luggage or getting robbed in

India. The probabilities presented here are partly a result of "The Almanac Game", presented in Exercise 16.1 in the book, and partly a result of exaggeration, to make the outcome vary more, and obtaining a more interesting model.

Also, using 11 different variables, there are a lot of possible dependencies (Time of year-Weather, Chances of getting robbed-Economy, etc.), with some time one could argue for a lot of dependencies here. Still, to keep the model a bit simpler, these 11 variables are assumed conditionally independent.

The model also contains 6 variables representing the "users" desires, and together with the uncertain variables, this is the basis for making the decision. This leads us to the utility function, which measures the "success of our decision".

Again, this model is in no way perfect, and in the end, I would guess that the user knows if he wants to go skiing or to the beach. Regardless of this, we assume that he/she does not know. He/she proceeds by choosing desired climate, personal economy, time of the year, desired level of social interaction, desire of meeting celebrities and desired level of activity.

The quantification of utilities presented in this model is a result of personal preferences on the outcome states, as well as some tinkering with the values, evaluating the corresponding results. For instance it is far more comfortable to be in the hospital in Switzerland than in Tanzania, and it is in my opinion better to go skiing alone than to be alone at the beach, and thus the utilities are adjusted correspondingly.

## 2 EXAMPLES

In this section, we have 3 different test-subjects; Carl, Mary and Joe.

### 2.1 JOE'S PREFERENCES

As Joe is an introvert guy with money problems, wishing to go skiing in the summer, we obtain the following results:

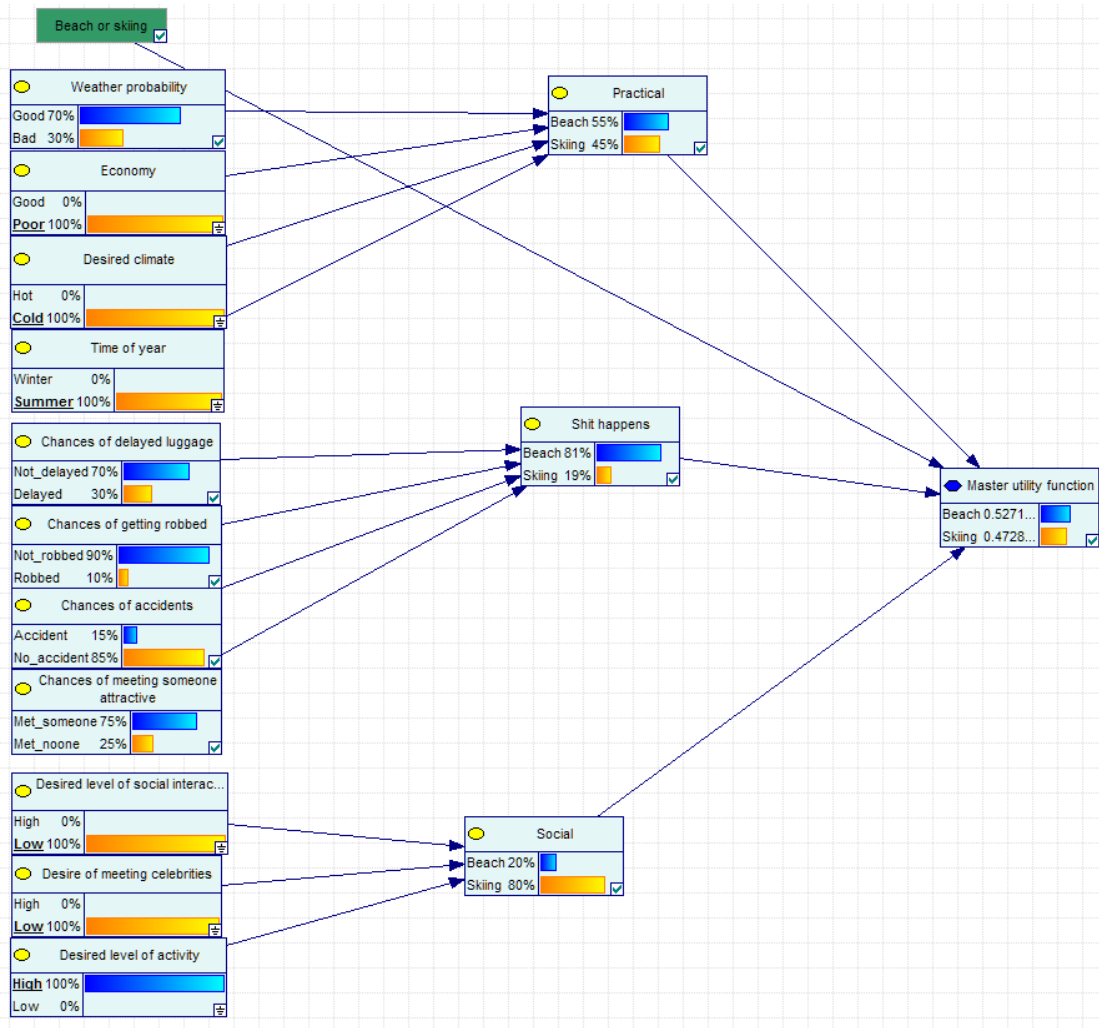


Figure 2.1: Joe's choices, and corresponding results.

In Figure 2.1 we see that the utility function is leaning towards going to the beach, despite Joe's wishes to go skiing. This is, of course, a result of the quantification of utilities; Joe is poor, and its in the middle of the summer, so he can't afford to go skiing, even though he wants to get away from people and stay in the cold.

## 2.2 MARY'S PREFERENCES

Mary is a poor girl, wanting to go somewhere warm and meet people in the middle of the winter, staying far away from any kind of activities.

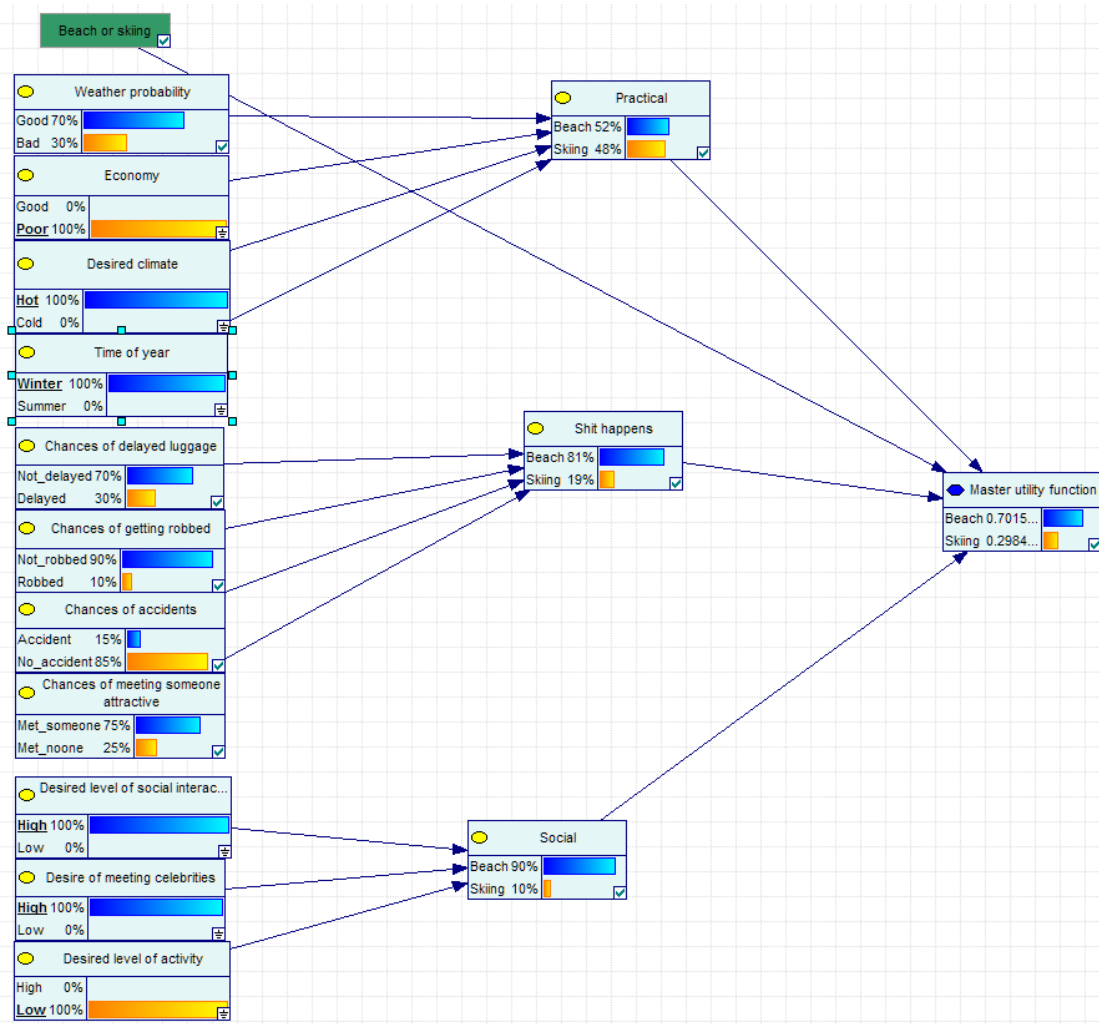


Figure 2.2: Mary's choices, and corresponding results.

This is an easier decision, she wants to go to the beach, the beach is cheap, social, and fitting all of her needs. The only obstacle here is that it is, indeed, winter, but even the "Practical"-variable gives the beach a small victory.

### 2.3 CARL'S CHOICES

Carl is a rich guy, wanting to go skiing in the winter, kind of antisocial, looking for constant activity.

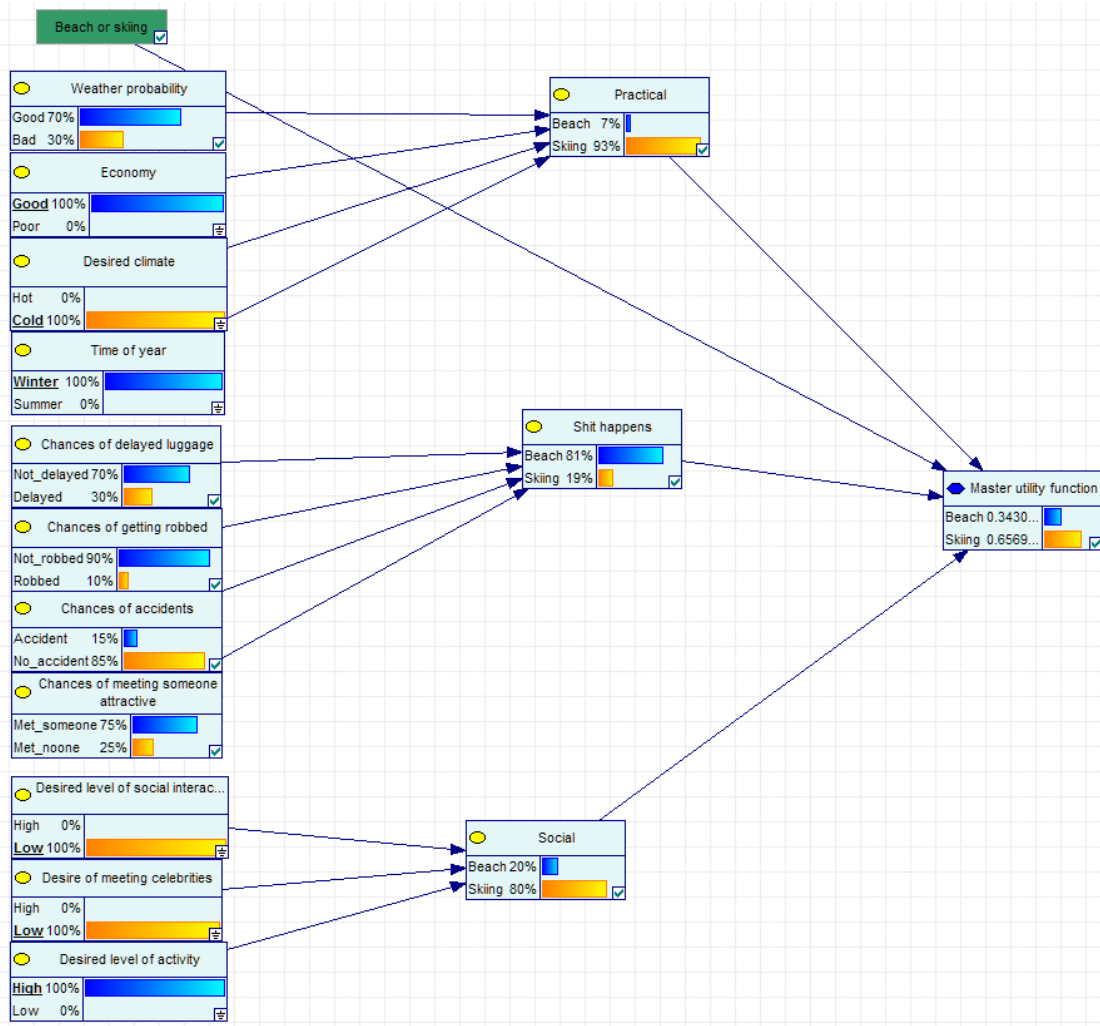


Figure 2.3: Carl's choices, and corresponding results

It can be seen here that the decision is, again, quite simple. Still, with every preference, as well as the time of year, set on skiing, beach gets a quite high score. This is because of the quantification of utilities in the "Shit happens"-variable, which always points towards the beach; it's harder to go skiing without skis than to swim without a towel.

### 3 CONCLUSION

Creating this decision support system (DSS) turns out to be both easier and harder than I first imagined. Using GeNIe was kind of straight-forward, and implementing the model was fairly easy, but the quantification of utilities and uncertainties requires a lot of thought and insight in the area the model is supposed to be implemented in if the model is to be of any use. In addition, it is more or less impossible to represent the real world dependencies perfectly. As a

reason of this, I would think that DSS is a far more valuable tool in more or less deterministic choices.