Methods in Artificial Intelligence Homework 5

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1   Decision Model

My decision model describes whether I should play Red Dead Redemption 2 (I am addicted), or if I should do homeworks in a weekday evening. My problem consists of the following:

- **Decision:** Study or Play Video Games.

- **Uncertain Variables:**

  - **Sleep Quality** and length the night before
  - **Social Interaction** during daytine
  - **Deadline Proximity**. Which is a very big motivator
  - **Energy level**, indicating how much energy
  - **Concentration Ability**
  - **Stress level**. I work better under pressure :)
  - **Knowledge Gain** from doing video games (none) or studying (usually alot)

- **Utility:** The overall benefit of the decision.

2   Graphical Representation

Based on the decision, variables and utility node, I have created the following graphical representation of the problem decition. The figure was made in *drawio* and I chose to keep the same color scheme as in the book:
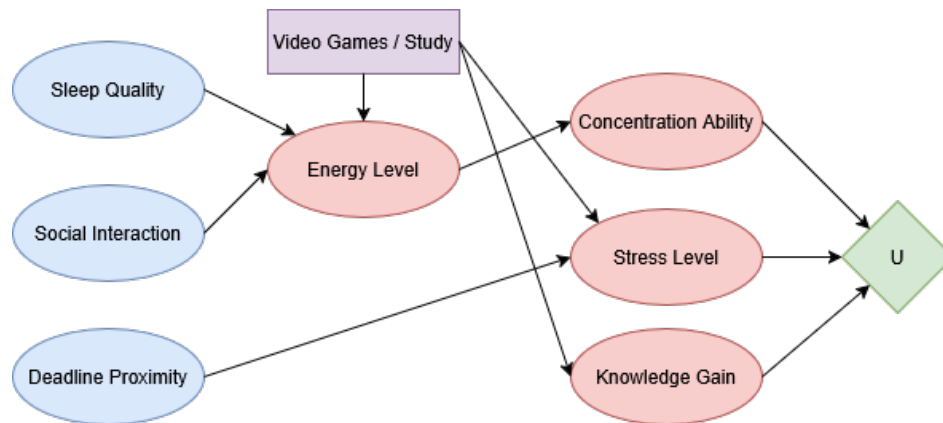

Figure 1: My Decition Network for whether I should study or play video games

3   Assumptions

3.1   Values for my Nodes

The different nodes have the following binary values:

- **Sleep Quality**: High / Low

- **Social Interaction**: High / Low

- **Deadline Proximity**: Far / Near

- **Energy level**: High / Low

- **Concentration Ability**: High / Low

- **Stress level**: High / Low

- **Knowledge Gain**: High / Low

3.2 Connection between Chance Nodes

My model makes the following connections between the Chance Nodes, and my Decision node (shown in Figure 1):

- **Sleep Quality** and **Social Interaction**, as well as *playing Video games* positivly influences my **Energy levels**. *Stying* negativly affects my **Energy**

- **Concentration Ability** is positively affected by **Energy Level**.

- **Deadline Proximity** strongly positively impacts **Stress Levels**.

- **Stress Level** is positivly affected by **Deadline Proximity** and me *Playing Video Games*, and negativly affected by me *Studying*.

- **Knowledge Gain** is positivly affected by *Studying*.

3.3 Inpact on Utility function

- A High **Concentration Ability** will affect in a higher chance of me *Studying*

- High **Stress Levels** will affect in a higher chance of me *Studying*

- A High **Knowledge Gain** will affect in a higher chance of me *Studying*

4 Chances and Probabilities

4.1 Energy Level

My Energy level is affected by my Sleep Quality, Social Interaction and my Decition

4.1.1 Sleep Quality

- **High Sleep Quality:** If I get a good night's sleep (7-9 hours), the probability that my **Energy Level** will be high is quite high.

  - *P(Energy Level = High | Sleep Quality = High) = 0.8*

- **Low Sleep Quality:** If I have a bad sleep (less than 5 hours), the probability that my **Energy Level** will be low is higher.

  - *P(Energy Level = Low | Sleep Quality = Low) = 0.7*

4.1.2 Social Interaction

- **High Social Interaction:** When I've had a lot of social interaction during the day, my **Energy Level** tends to be higher.

  - *P(Energy Level = High | Social Interaction = High) = 0.8*

- **Low Social Interaction:** If I've had a quiet day with little social interaction, my **Energy Level** tends to be lower.

  - *P(Energy Level = Low | Social Interaction = Low) = 0.5*

4.1.3 Study / Play Video Games

- **Playing Video Games:** Playing video games can help me relax and usually increases my **Energy Level**.

  - *P(Energy Level = High | Playing Video Games = Yes) = 0.8*

- **Studying:** When I study, my **Energy Level** is usually reduced somewhat.

  - *P(Energy Level = High | Studying = Yes) = 0.3*

4.2 Stress Level

My Stress level is affected by the Deadline Proximity and my choice of action.

4.2.1 Deadline Proximity

- **Deadline Near:** When a deadline is near, my **Stress Level** increases significantly.

  - *P(Stress Level = High | Deadline Proximity = Near) = 0.9*

- **Deadline Far:** When a deadline is far away, my **Stress Level** tends to stay low.

  - *P(Stress Level = Low | Deadline Proximity = Far) = 0.6*

4.2.2 Study / Play Video games

- **Playing Video Games:** Playing video games will reduce my stress as I get to relax:

  - *P(Stress Level = High | Playing Video Games = Yes) = 0.1*

- **Studying:** When I'm studying, my **Stress Level** my stress levels reduces, as long as I am productive, if I'm not then I just get more stressed:

  - *P(Stress Level = High | Studying = Yes) = 0.4*

4.3 Concentration Ability

My concentration level is decided by my Energy Level

4.4 Energy Level

- **High Energy Level:** If I'm feeling energized, I can concentrate better, so my **Concentration Ability** is likely to be high.

  - *P(Concentration Ability = High | Energy Level = High) = 0.8*

- **Low Energy Level:** If I'm low on energy, my concentration ability tends to drop.

  - *P(Concentration Ability = Low | Energy Level = Low) = 0.7*

4.5 Knowledge Gain

The Knowledge gain is directly tied to my decision to study or not

- **Studying:** When I study, I usually gain a lot of knowledge.

  - *P(Knowledge Gain = High | Studying = Yes) = 0.9*

- **Playing Video Games:** I usually don't learn alot from video games...

  - *P(Knowledge Gain = High | Playing Video Games = Yes) = 0.1*