Airport Security Profiler

Exercise 3
TDT4171 - Artificial Intelligence Methods

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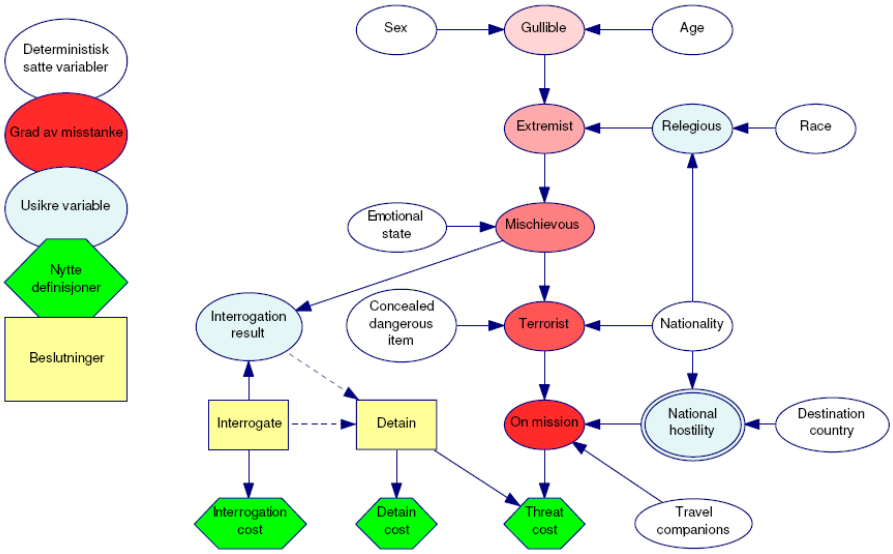


We have color coded the model with red to indicate the increasing degree of suspicion towards the subject. This also indicates the main path through our model. The variables generally have an increased impact on the outcome the further down in the chain they enter.

1 Introduction

We have chosen to create a support system for terrorist profiling at airport security. The security personnel at a security check point feeds the system superficial information about individual travelers and tries to calculate the chances of that individual being a terrorist on a mission. It does this by going through a chain of implication and grades the persons gullibility, extremism, mischievousness, terrorist proneness and finally mission readiness. The system then advises the security personnel on whether or not to stop the individual for further interrogation taking in to account the required resources. The result of this interrogation should thus give grounds for release or detention. Detaining someone of course has its own cost which must be taken in to account.

We have chosen to limit many of the variable domains in order to simplify the model. This is especially necessary since the number of probability inputs grows unreasonably fast in relation to many of the variable domain sizes. This of course does not limit the validity of the model itself. The chosen domains are used in order to illustrate functionality and the principles behind the model, only.

2 Assumptions

Gullibility The model assumes that age and sex affects a subject's level of gullibility. This comes as a biological property of children and young people's continuous searching for knowledge. The special ability of young people to uncritically consume knowledge, regardless of source, gives them an inherent gullibility that makes them prone to having extremist views. Furthermore we regard the sex of a subject as applicable since young males have an underdeveloped sense of social adherence, making them more lightly to have a higher level of gullibility.

Extremism We assume that race and nationality gives good indications on what degree of religiosity an individual practise. This is because race and nationality gives a good indication of which cultural herritage a person has and therefore also the probability for strong religious roots. Extremism on the other hand describes if an individual is likely to be a extremist in any religious or other way. The degree of religiousness is therefore an important parameter for deciding the probability of extremism. We have also assumed gullibility to be an important factor since many gullible individuals can be persuaded and coerced to extremism through manipulative methods.

Mischievousness We have coupled the level of extremism with the emotional state of subjects in order to define the chances of them having mischievous intentions. This does not itself underpin a subject's probability of being a terrorist since mischievous intentions could just as well indicate that a subject is a

smuggler or something more "innocentsuch as being unfaithful to their significant other. We have chosen to ignore other unlawful intentions, i.e. smuggling, that the system may be able detect since this is the jurisdiction of the customs officers at arrival, and not the security officers at the departure checkpoint.

Terrorist proneness The model also assumes that a person's nationality is related to the probability of the individual being a terrorist. This can be seen from statistical evidence from recent terror attacks. In addition to this we found that the combination of patriotism and religiosity is one of the more powerful forces of influence known. We have thus emphasized this persuasive mechanism through modeling nationality as a source of both religiosity and terrorist proneness. Furthermore we have chosen to make concealed dangerous items an observable fact from the security checkpoint routines. We assume that if such items are found it would be a strong indication of the subject being a potential terrorist.

Mission readiness We have chosen to define that few terrorist take their family on missions. This is a reasonable assumption since travel companions could be an important condition in determining whether we are in fact facing a terrorist attack. Again due to complexity issues we have chosen to focus on whether or not someone is traveling with their family. The model could be appended with other traveling party arrangements such as friends or couples, but here we feel that the family situation gives a good enough indication of whether the subject is on a terrorist mission. We have also created a bitmap between the travellers country of origin and the destination country that defines the general hostility between the nations. This ofcourse affects the probability probobilityof whether the traveller is on a mission or not.

Subject interrogation We added a supporting decision variable, interrogate, which can clearify if the individual is mischivious with a 95

Subject detention The final decision in our model is whether or not the traveller should be detained. This is affected by the possible interview, a utility connected to the chance of the traveller being on a terrorist mission and a utility that represents the cost of the detention. We have set the value on the interview to -1, and then derived the other utilities with this in mind. After which we also did a lot of calibration to make the model behave as we wanted.

3 Probability assumptions

Gullible propability table

Age	Young		Old	
Sex	Female	Male	Female	Male
Yes	0.2	0.8	0.01	0.1
No	0.8	0.2	0.99	0.9

Extremist propability table

Relegious	High		Low	
Gullible	Yes	No	Yes	No
Yes	0.1	0.7	0.9	0.9999
No	0.9	0.3	0.1	0.0001

Mischievous propability table

Extremist	Yes			No		
Emotional state	Nervous	Angry	Unknown	Nervous	Angry	Unknown
Yes	0.07	0.08	0	0.7	0.8	0.6
No	0.93	0.92	1	0.3	0.2	0.4

Terrorist propability table

Mischievous	Yes					
Nationality	AlphaNation		BravoNation		CharlieNation	
CDI	No	Yes	No	Yes	No	Yes
Yes	0.0000001	0.000001	0.0000001	0.000001	0.000005	0.00005
No	0.9999999	0.999999	0.9999999	0.999999	0.999995	0.99995

Terrorist propability table continues

Mischievous	No					
Nationality	AlphaNation		BravoNation		CharlieNation	
Concealed Item	No	Yes	No	Yes	No	Yes
Yes	0	0	0	0	0	0
No	1	1	1	1	1	1

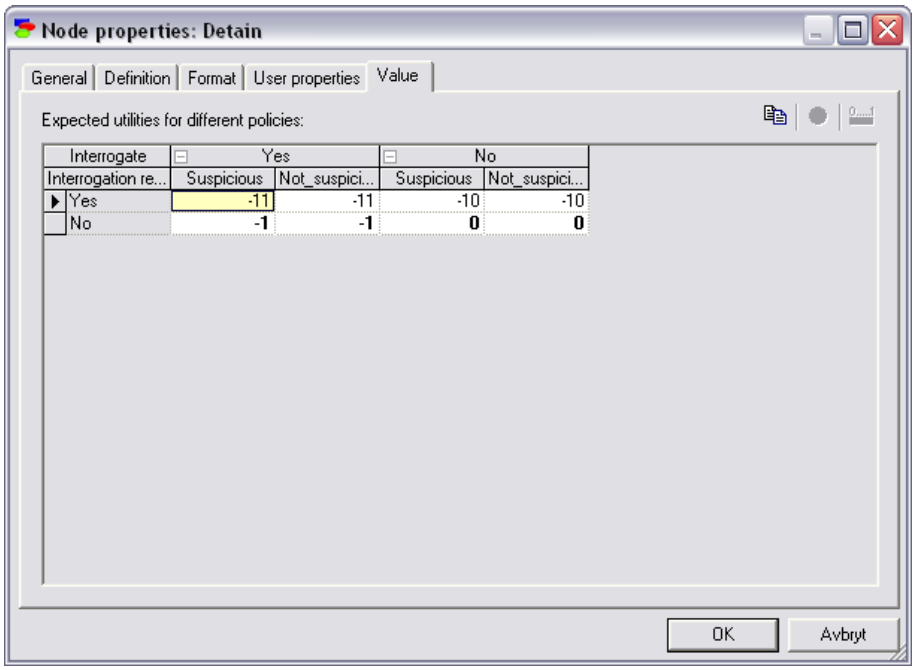
On Mission propability table

Mischievous	Other				Family			
National Hostility	Yes		No		Yes		No	
Terrorist	No	Yes	No	Yes	No	Yes	No	Yes
Yes	0.1	0	0	0	0.01	0	0	0
No	0.9	1	1	1	0.99	1	1	1

4 Example results

4.1 Innocent

The subject of the first case is a young blue girl from AlphaNation traveling with her mother and father to somewhere in her own country. She's happy and adheres to the contraband regulations of the airport.

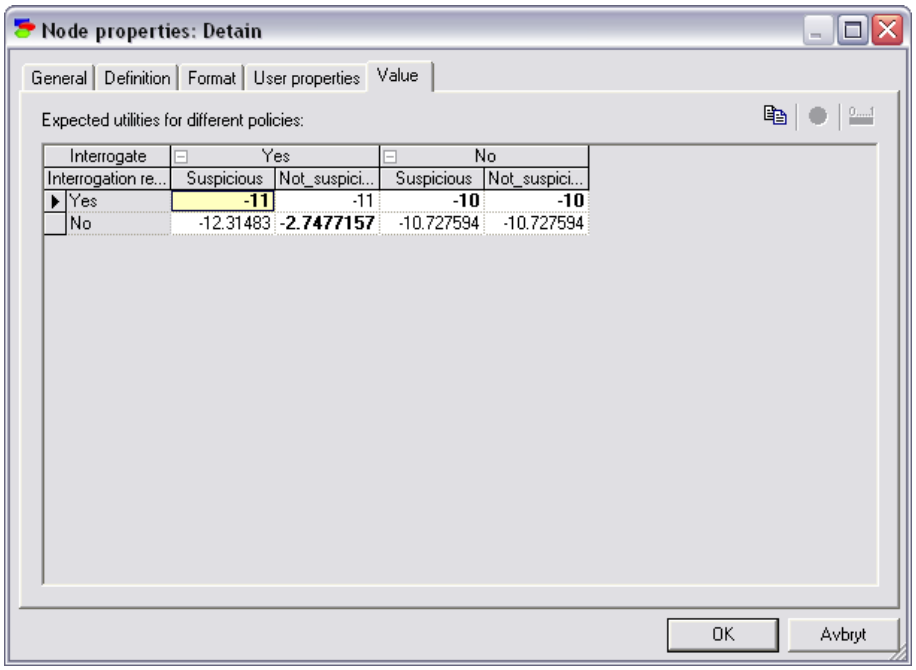


Interrogate	Yes		No	
Interrogation re...	Suspicious	Not_suspici...	Suspicious	Not_suspici...
Yes	-11	-11	-10	-10
No	**-1**	**-1**	**0**	**0**

From the results we see that this innocent girl will have no problems with her trip.

4.2 Suspicious subject, but innocent

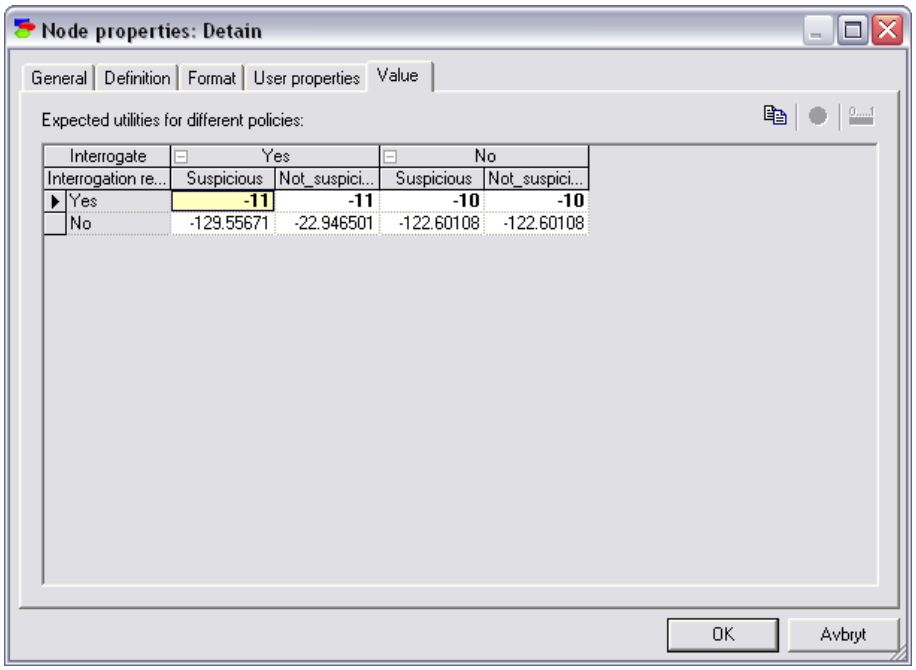
The second case is about a red male teenager who is nervous about travelling to AlphaNation for the first time. He is careful not to bring any contraband.



The teenager must unfortunately be interrogated, but after some questioning he is allowed to continue his trip.

4.3 Obvious terrorist

The fourth case is a young red male college dropout from CharlieNation. He has extremist views and wishes AlphaNation to burn in hell. His way to martyrdom is through C4 strapped to his waist.



This troubled young male is in no doubt a terrorist and gets swiftly detained even without interrogation.

5 General notes and conclusion

As we have implemented the model we have uncovered an inherent sensitivity to threat when it comes to a subject's nationality and where the subject is travelling to. This is due to our assumption that an individual's inclination towards terrorism is strongly connected to its nationality. This effect is increased by the assumption that individuals are only inclined to attack a country hostile to it's own. If these variables are not specified it is nearly impossible to reach a detain decision. This is still an effect we chose to keep since it is our understanding that nationality and destination is some of the most influential variables in deciding a potential terrorist.

This system lacks depth in many facits, but is able to illustrate many important social structures needed to be uncovered in order to sucessfully implement a reliable profiling tool. We are aware of the controversiality of such an automated system, and in no way do we intend to stigmatize any spesific social group. When that is said the model is made to be transferable and applicable for real-world use.