Kennissystemen - Assignment 2

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1 Interaction scheme

For this expert system, we assume it to be a mostly system-drive interaction scheme. thus the system will answer questions to which the user has to respond. When the user starts it up, then the system will first ask her what her symptoms are. The user can choose from a list of symptoms that describe her condition and the system will try to classify an illness. It will do so by running the inference engine on the two taxonomies *diseases* and *symptoms*. If the system can nail down the result set to one single answer then it classifies the user to have a certain disease. If there are multiple answers in the result set, the system will try to ask more specialised questions about the symptoms and also about background information if applicable. The background information questions will be retrieved from the sets of diseases in the result set. Here, the system will enumerate all diseases in the result set and ask questions about their attributes like 'incubation time' or 'area of occurence'. So can for instance, a symptom 'pain in stomach' be an indicator for many diseases. But if the symptoms get specialised to 'pain in the upper right area of the stomach' together with the additional fact that the user was on 'Vacation in South Africa', then the system can eventually tell her to see a specialist for worms.

Essentially, the interaction does switch from the system to the user and back in turns. The system will answer questions, which are derived from the knowledge gained by previous answers. The user will simply answer multiple choice questions. Hence the input is a list of symptoms/information and the output is a set of potential diseases and eventually a set of follow up questions.

It could also be that the user is in total control. He can tell with natural language how he is feeling and the system is parsing it and trying to figure out a response. However, even in that case, the system will mostly be system-driven. It has to ask questions at a certain moment in order to be able to classify a disease to which the user has to answer.

2 Extreme Cases

2.1 System-Driven interaction scheme

An example for a System-Driven interaction scheme would be: (S = System, U = User).

S: Hello, can I have your name please?

U: Muriel

S: Hi, Muriel. You are here to get diagnosed. Please choose from the following set of symptoms (separated by comma, ending with a dot):

S:
1. Klachten Huid
2. Klachten Darm
3. Allgemene Klachten

U: Klachten Darm.

S: Thank you Muriel. According to your symptoms, there are 20 possible diseases. Please choose from the following set of specializations (separated by comma, ending with a dot):

S:
1. Kramp
2. Diarree
3. Pijn rechtsboven

U: Pijn rechtsboven, Diarree.

S: I see. Muriel, it seems like you have one of the following diseases: Bilharziawormen, Zweepwormen, Lintwormen. In order to get a more precise answer, could you please tell me which of the following things is of applicance to your case:

S:
1. Visit to South Africa
2. Visit to South America
3. None of the above

U: None of the above

S: According to my knowledge, you are suffering from Lintwormen. Please consult a specialist. Thank you very much for your time and patience.

Note that we have omitted details about the steps that the reasoning engine does take. In our implementation, the system will offer the option to print out the steps it takes so that the user can see why the system is choosing a particular answer. These reasoning steps include narrowing down, backtracking, re-asking questions when contradictions arise etc.

2.2 User-Driven interaction scheme

Even though we will not use this interaction scheme, we will give a potential description of a extreme scenario in which the user is leading the interaction.

Step 1: The user will fill in a template which includes sections for symptoms, areas travelled to with dates, treatments received with dates which is then uploaded to the system.

Step 2: The system will parse the file and narrow down to all possibilities, when conflicts arise the system will keep track of multiple structures containing diseases with the corresponding symptoms.

Step 3: According to the result of Step 2 there could be different interactions:

1. There are no contradictions, only one possible disease:
   The system will inform the user of the disease he or she has.
2. There are contradictions:
   The system will ask the user to upload photos of the symptoms if possible. Based on this it will see which of the options it has still open correspond to the symptoms. If photographs are not available the system would ask the user to rate the symptoms he or she has on a scale of 1 to 10. Based on this it will see if it can make a decision. If not it will asssume the user has multiple diseases and refer him or her to a specialist.
3. There is no disease:
   This will happen if, for example, the user only specifies only symptom, let's say misseljkheid. The system will ask the user to rate the disease. If it is above a certain threshold which is high enough for the symptom it will see which diseases are linked to this symptom and revert to a mode which is system-driven. It will ask if the user experiences any of the symptoms linked to the current symptom and narrow down the options. If applicable the user is referred to a specialist.

Again, details of specific underlying steps of the system are omitted. It is clear that the system at the start is solely user-driven but if needed it will ask questions to narrow down the possibilities. This is needed due to a wide variety in users, one will state symptoms he or she can hardly notice, while others will only mention symptoms that are nearly unbearable.