Telling a computer about your habits and values

Interactively building Action Identification Hierarchies for personalized support.

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Background

Behavior chance support systems (BCSS) are designed to assist users who have difficulty executing or changing certain behaviors [1]. These difficulties might occur because habits need to be broken, for example when trying to eat healthier, but also because users are unable to perform a behavior, such as visually impaired people having difficulties crossing the street. For technology to support people's behavior in an appropriate way, it needs to take into account what people consider important in life, i.e., their values, and how different actions relate to these values [2].

To create such BCSSs, a knowledge representation structure was developed capable of expressing Action Identification Hierarchies (AIHs) [3]. These AIHs can be used to express relations between behavior, for example that having a salad is a way of eating lunch, or that crossing the street is a part of going to work. It is important though, that the AIH used by a BCSS is an adequate representation of a user's conceptualization of their behavior, to provide personalized support. An AIH should therefore be constructed with care, for individual users, preferably with their input. Moreover, in order to provide value-aware support, the AIH should represent how behavior is related to a user's values, for example that eating salad for lunch promotes health.

To construct a personalized AIH for a user, an elicitation system was developed. The aim of this system was to study if an adequate AIH could be constructed via a dialogue with the user. During our demo, visitors can participate in a dialogue with the system to build a part of their own AIH, describing their own actions. In this way, people can experience how our system builds a representation of their behavior.

System

Figure 1 shows an outline of the architecture of the elicitation system. The system has two main components. First, a reasoner component has a digital representation of the AIH of the user. Implemented in the agent programming language GOAL [4][i], this reasoner is an agent that has the behavior tree as belief-base. This agent determines what question about a user's values and behavior should be asked next, based on the current state of the behavior tree. The other component is an interface implemented in Java for the human interpreter, a so-called 'Wizard of Oz'. At the moment, our interest lies in building the tree, and not in natural language understanding. A human (the 'wizard') will therefore interpret the answers of users following a set of rules, to make them suitable for the system. For instance, if the user mentions that 'I need assistance making a healthy salad', the wizard will enter making_healthy_salad as answer into the system. A visual representation of the AIH tree is included in the wizard interface, so they can keep track of the state of the AIH. The system uses text-to-speech technology to pose the questions to the user.

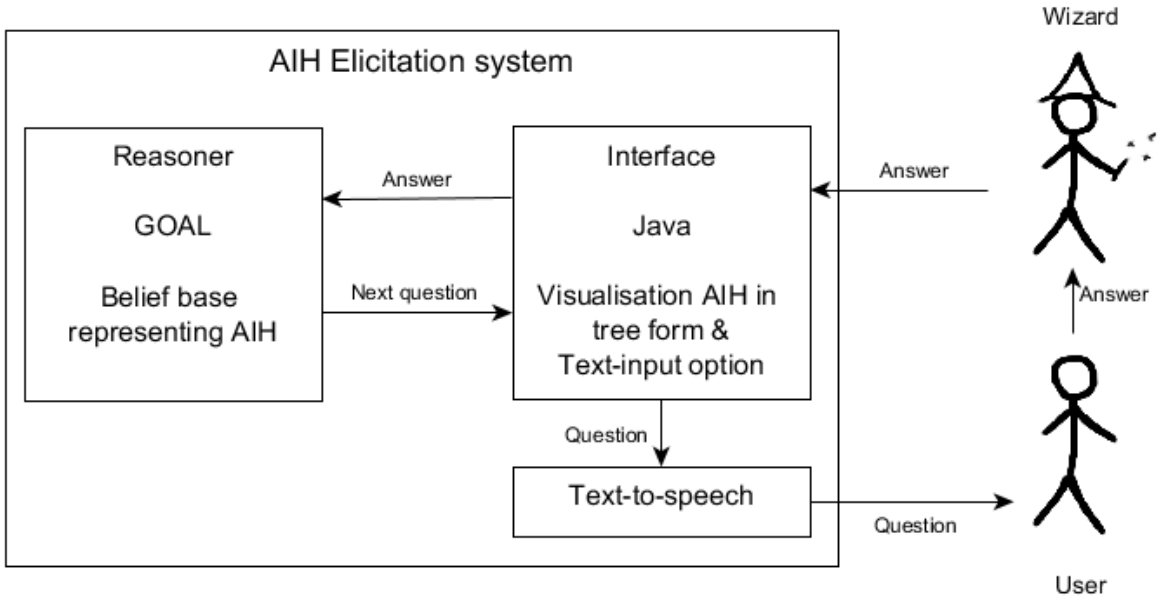

Figure 1. Architecture of the AIH elicitation system

The reasoner determines what question to ask next in order to build the AIH describing activities of the user. It will initially focus on the action the person needs most assistance with, and will alternate between asking what ways a person has of doing an action, and what parts an action has. If all the actions requiring most assistance have been described, it will continue to build the tree for all other actions requiring some assistance. After a tree has been constructed, the reasoner will also ask questions to determine how often behaviors occur. Finally, values can be attached to certain actions, so the BCSS can later know why performing certain actions are important to the user. Figure 2 shows an example of a complete behavior tree.

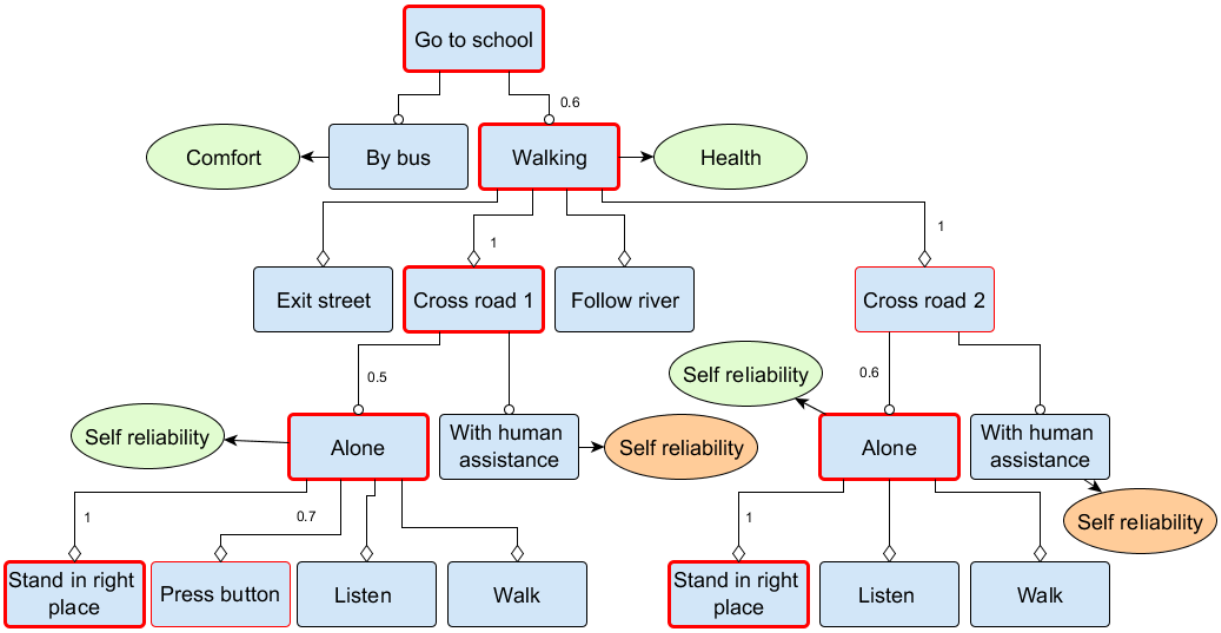

Figure 2. Example of AIH. Red denotes the person requires assistance, thick line that it's the most urgent. Round nodes are values which are promoted (green) or demoted(orange).

Demo

Visitors can interact with our system during the demo, answering the questions to build their personalized AIH. Aside from answering the questions of the system, they can also see the AIH represented as a behavior tree on the screen. This tree is a representation of the knowledge of the system, so visitors can get an insight into the internal state of the system. The authors of this proposal will be on hand to enter actions into the system and act as Wizard.

Aside from this live demo, we will also show some clips of an application of our system. In a current collaboration with the Czech University in Prague, we apply our system to a navigation tool for visually impaired people. Within this context, it is important to know exactly what travelling activities users require assistance with. This movie clip will provide some insight into the type of applications of the demo system.

References

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