Visualization of User Model in Educational Domain

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Motivation

User model represents user characteristics, but it is often invisible for students and teachers

Student have not any possibility to direct affect her user model

Problem of combining several data inputs

Aim - method for visible transparent user model with separated processing and representating of user characteristics

User Model

We designed an overlay user model based on light weight representation

Domain-independent (e.g. age) and domain dependent characteristics (knowledge)

The value of the domain-dependent characteristics is represented by a three-dimensional vector [value, confidence, source]

Method for combination several inputs, which enter into user model
- value and confidence is separated in process of combining

value of knowledge by tool N

$$c_k = \frac{\sum_{N \in S} c_k(N) * p(c_k(N)) * d(N)}{\sum_{N \in S} p(c_k(N)) * d(N)}$$

confidence of knowledge by tool N

$$p(c_k) = \frac{\sum_{N \in S} p(c_k(N)) * d(N)}{\max(\sum_{N \in S} d(N); 1)}$$

confidence of method/tool

Spreading of characteristics based on spreading in graph

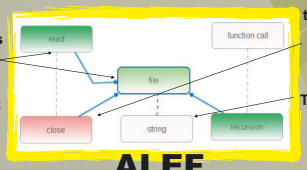
Visualization

Visualization allows to interfere between believes modeled by the system and what user thinks

Visualization as a tool to evaluate user model

Three main features:
- to show the students what is the system believes about them
- to provide an insight into a user model
- to allow students to give explicit feedback

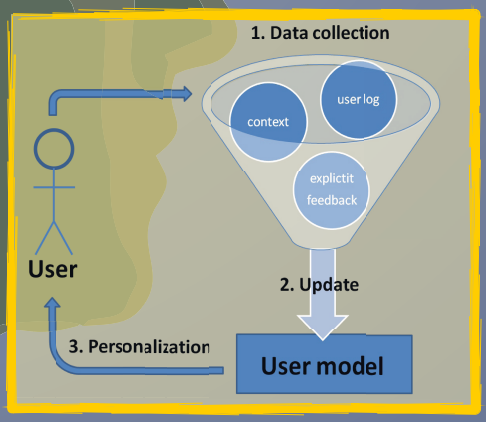
The green color is used to label the terms that user understood. The brighter color indicates the level of user knowledge about the term



ALEF

The red color shows the term with some sort of defect in the learning process

The white colors is used to label the term, which user have not worked yet with



Experiment

Short experiment
- 5 participants, qualitative experiment,
- they worked with an example of visualization of user model & had to fill out questionare
- experiment suggested that the participants considered the visualization of user model interesting. They appreciated the general principle of the visualization, and understood the proposed visualization

Long term experiment
- domain of functional and logic programming in ALEF, 10 participants
- currently still in progress
- users work with their user model and we track if they agree with the statments in the model

Contributions

The method for combination several inputs allows to add flexible new tools for modeling user characteristics

Proposed visualization method allows to gain a global overview, get a clearer overview of dependencies and adjust the sensitivity of the own user model.

The visualization method can be used in any adaptive educational system, which models users and provides user model

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