

Concept-Cloud Navigation in Educational Web-Based System

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In this project we focus on improving the navigation within the web-based educational system ALEF. The goal is to propose a method of content recommendation with the help of displaying keywords representing content elements. The method is focused on effective detection and elimination of misconceptions in student knowledge. The ALEF system consists of so-called *learning objects* of three types: *text-explanations*, *questions* and *exercises*. *Metadata* is used to define learning objects. The learning objects are linked to *concepts*, which are represented as keywords. In our method, we are particularly interested in these concepts.

In our approach, the keywords (concepts) are displayed in a form of tag clouds. Two types of concepts are displayed in the concept cloud in separate boxes. The first type is *Related concepts* – all the concepts linked to the currently opened learning object. They serve the purpose of fast switching among similar learning objects that belong here. The second part of the cloud – *We recommend* – is a personalized set of recommended concepts devised from the user's activity history.

During navigating in the system, we can move to learning objects using the main menu. By selecting a learning object in the menu, we get to a new state, and the particular information is displayed. On the other hand, the tag cloud is used differently. Instead of navigating the user to an actual learning object, it recommends topics he/she should deal with. By clicking on a concept in the tag cloud, the related learning objects are consequently highlighted in the main menu. In this way we indicate a suitable direction for the user to navigate but the final decision to select one of the recommended objects remains to be made by the user.

Recommendation methods are processes, which have certain inputs and outputs. The inputs of these processes are learning objects of a given type. For each input object a single concept is recommended on output. Each output concept has an associated priority, which represents the strength of the recommendation. Our method then selects the concepts with the highest priorities and displays them in the tag cloud part "We recommend".

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One of the recommendation methods is *Method based on questions and examples solutions* (see Figure 1). The input of this method is a question or example, which was incorrectly solved by the user. In this case the priority of the concepts linked to the input learning object is given by quotient of the representation relation weight and the knowledge of the concept. If there are more concepts linked to one input learning object, we choose the one with the highest priority. The outputs of the recommendation are concepts of learning objects, which should be studied again over by the student in order to improve proficiency in the particular topic.

Another method is a *Method based on reading of learning materials* (see Figure 1). The input is a text-explanation that was read (visited) by the user, but it does not have any linked concepts, which have a knowledge relation with the user. It is about learning materials students have already read, but have not practiced yet. The system recommends questions and examples which are related to the previously read text.

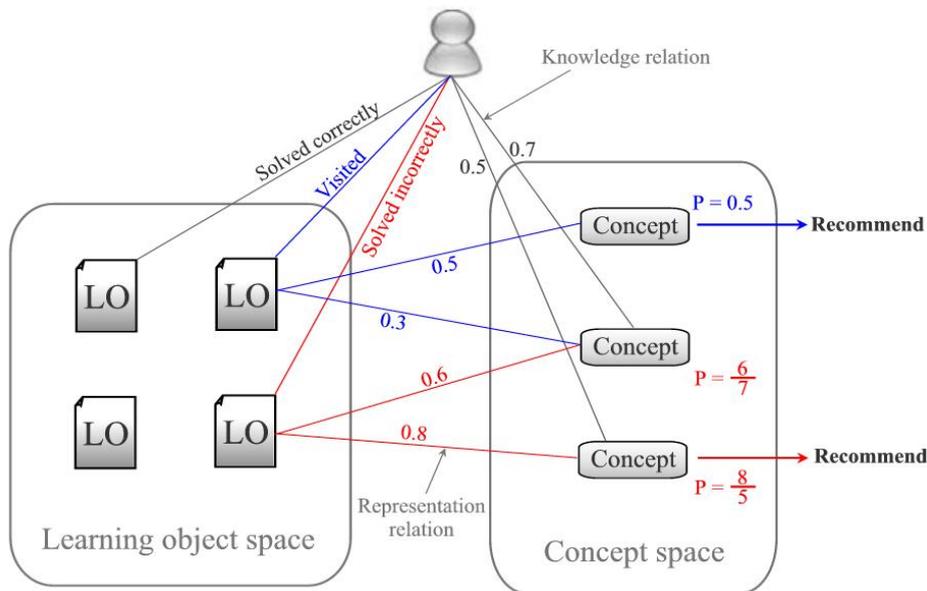


Figure 1. Selecting concepts for recommendation utilizing user's activity history.

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References

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