Educational Content Recommendation Based on Collaborative Filtering

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In the past students could only study from handwritten books and to achieve their goals, which were to pass the exams or expand their knowledge, they could only relay on the teacher to guide them through the mass of information. But times have changed. Thanks to E-learning and the Internet students have access to all information they could ever possibly need, but without any guidance. Some people do not need any guidance, they intuitively know which path to choose; but for those who do, recommendation systems are the perfect tool to guide them through the lectures they need to process.

There are all sorts of recommendation systems which are based on different methods. Some of them recommend based on geographical data, some learn from the user, some recommend based on previous actions; the list of techniques is endless. But every method can be traced back to two main recommendation types: content-based or collaborative. In this project we will try to create a recommender system that is based on a hybrid technology, which uses the best aspects of the two main types: collaborative and content-based recommendation and later implement it in the system ALEF. ALEF or Adaptive Learning Framework is an E-learning system which was created by Slovak University of Technology, more precisely by the Faculty of Informatics and Information Technologies. Since this recommender will be implemented in an E-learning system the main goal is that the recommender will be able to guide the student through the courses recommending exactly those studying materials that he or she will need to successfully pass the course.

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 mainly interested in these *concepts*, because they are the key factor of the calculations in our recommender, but the final output of our solution are the *learning objects* themselves. In our approach, the *learning objects* are displayed in a sorted tag cloud. The tag cloud is sorted by the rate of similarity between the users and the rate of knowledge relation between the users and the *concepts*.

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

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Spring 2012 PeWe Workshop, April 1, 2012, pp. 9–10.

particular information is displayed, but the choice of the *learning objects* stays constant. On the other hand, by selecting a *learning object* from the recommender also leads us to the information, but after that the recommender will recommend a different set of *learning objects*. Since our recommender uses a hybrid approach, we can receive a different output for every combination of *user* and *learning object*.

In our recommendation method we use relations between *entities,* which are granted by the domain model and the user model of the system. Relations like "User To *Concept* Relation", "*Concept* To Learning Object Relation" and "*Concept* To *Concept* Relation". The process of our recommendation algorithm is the following.

1. The input is the *user* and the viewed *learning object*.
2. All *concepts,* which are related to the *learning object,* are fetched
3. All *concepts,* which are related to the previously fetched *concepts,* are fetched
4. The similarity is calculated between users
5. The *concepts* of the most similar users are mapped to our relevant *concepts*
6. The most relevant *concepts* are transformed back to *learning objects*
7. *Learning objects* that have the highest rating are recommended

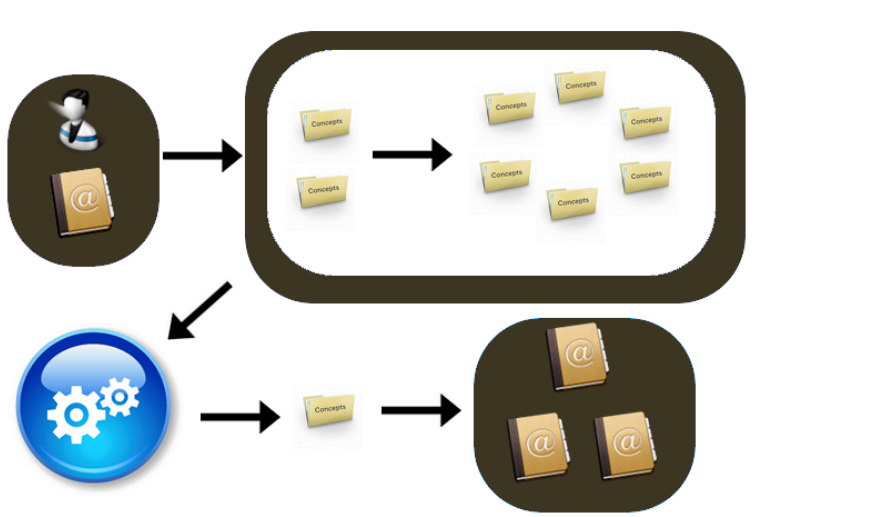

Figure 1. Recommendation process of the designed hybrid method

Acknowledgement. This work was partially supported by the Slovak Research and Development Agency under the contract No. APVV-0208-10.

References

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