

Using Recommendation System for E-learning Environments at degree level

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Abstract—Nowadays, new technologies and the fast growth of the Internet have made access to information easier for all kind of people, raising new challenges to education when using Internet as a medium. One of the best examples is how to guide students in their learning processes.

The need to look for guidance from their teachers or other companions that many Internet users experience when endeavoring to choose their readings, exercises or practises is a very common reality. In order to cater for this need many different information and recommendation strategies have been developed. Recommendation Systems is one of these.

Recommendation Systems try to help the user, presenting him those objects he could be more interested in, based on his known preferences or on those of other users with similar characteristics.

This document tries to present the current situation with regards to Recommendation Systems and their application on distance education over the Internet.

Keywords—E-learning, Recommendation Systems, CMS, Internet, Learning Objects

I. INTRODUCTION

WITH the new technologies, and particularly with the fast growth of the Internet, users find a great variety of books, newspaper articles, pages or movies, without the need for prior precise knowledge of the contents of every one of them. Users find themselves overwhelmed by the overload of information and seek help to identify the objects which may be more interesting for them. Most of the time, users solve this problem following other people's recommendations, or selecting the objects that look similar to what they are looking for.

A Recommendation System is an application capable of presenting a user a suggestion for an object, obtained on the basis of his previous preferences and the preferences of a community which has likings and opinions similar to his. For Batul, Recommendation Systems help us reduce the overload of information we suffer nowadays, providing, at the same time, customized access to information for a specific domain.

Recommendation Systems are used in areas such as e-commerce, leisure or digital libraries in order to solve the information overload they produce. However, there are many other fields that present a similar problem, such as those domains related to education and learning object.

Lets suppose that, in a teaching environment, a student finds at his disposal a great number of learning objects, such as practices or exercises. The student has at his disposal many more objects than he is able to use, and has no idea where he should begin, so bearing in mind the learning objects are classified by categories, he decides to begin with the basic level. The student browses through all these educational objects for their topics and remembers a friend told him how much he had liked those learning objects related with an specific topic. The student decides to start with those objects, and once he has finished with them he calls his friend so he can recommend him more since the ones he has already gone trough did match what he was looking for.

If we move this process to the field of distance learning, how can a student find the objects he will like the most? In order to resolve the information overload problem different techniques can be used, and one of them is based on Recommendation Systems.

Our investigation tries to prove the feasibility of using Recommendation Systems applications in educational environments. This article introduces the work that is being done to provide the educational environment with a recommendation system.

The rest of this work is organized as follows: section 3 will comment on the current state of distance learning and the problems it presents, section 4 justifies the use of a recommendation system as a solution to the problems we are facing, section 5 presents the general aims of the investigation, section 6 has a description and a presentation of the results obtained in the first stage of the investigation and section 7 closes this paper, presenting the conclusions drawn.

II. EDUCATION THROUGH THE INTERNET AND THE LEARNING-OBJECTS

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A. Definitions

Looking through specialized literature we find many different definitions for education through the Internet:

- 1) "An Internet formation is an environment created in the Web, in which students and teachers can perform teaching and learning tasks. It is not only a mechanism to distribute information through to students; it also supports tasks related with communication, students evaluations and class management " [6].
- 2) "Formation through the Internet is a hypermedia program that uses attributes and resources from the Internet to create significative learning environments, where training is improved and leveraged" [5].

Formation through the Internet poses several problems, such as the rising cost of design and creation of curricular material, the impossibility of reutilization and the interoperability of the curricular material just mentioned [8]. Learning objects (LO) are proposed as a possible solution to these problems.

According to Wiley a Learning Object is "any digital resource that can be reutilized to make learning easier" [10]. In this author's opinion, digital resource is defined as anything that can be distributed through the net, no matter how small or large it might be. Examples for small reusable digital resource are images, small portions of text, or small Web applications. Bigger size reusable digital resource examples are Web pages that combine text, images and other means of communication.

B. Distance learning and the learning-objects advantages

The principal advantage of distance learning and the use of learning-objects are:

- 1) Access easiness: a great amount of people can access the formation, making temporal and geographic barriers disappear. Time problems disappear as the Internet is available at any time. The movement problems disappear as well as a person can be formed without the need of travelling several kilometres or to another city.
- 2) Costs saving: many more people can be formed with fewer resources.
- 3) Customized formation: most of the courses are interactive allowing the user to choose the way of his formation according to his needs or personal interests.
- 4) Possibility of being in contact with other students, allowing a greater collaboration and information interchange.

C. Distance learning and learning-objects problems

The principal problem posed in the distance learning through the Internet with great learning object collections is that students can find themselves overwhelmed with the overload of information. As it has already been expounded, a possible solution are the Recommendation Systems

III. RECOMMENDATION SYSTEMS

The recommendation systems help the users to choose objects they can find useful or of their interest. A recommendation system is "the system that has, as principal task, to choose certain objects that meet the users requirements [9]. These objects can be any kind of information or articles, such as books, movies, songs, Web pages, blogs, etc.

The main operation of these systems is to ask the user to evaluate a series of objects. These evaluations will be used by the recommendation system to predict the user's evaluation of the object or the evaluations the user has done in the past. The more evaluations the users make, the better the results will be.

The recommendation system must provide a mechanism to compile the biggest amount possible of information from the users in order to make better recommendations. This process is called "retroalimentación.

A. Classification

In order to realize the recommendations there are two types of algorithms that give way to two big recommendation systems groups. [1], [2]:

- 1) Based in the content: the system recommends similar objects to those the user has liked in the past.
- 2) Collaboratives: the systems recommends the user objects that have been liked by users with similar likings.

A **recommendation system based in the content** is defined as: "system in which the recommendations are done based only in the profile made taking into consideration the object content analysis the user has evaluated in the past"[2].

The key of the systems based in the content is that the objects which can interest the user must be similar to the objects he has liked in the past.

The recommendation systems based in the content are mainly used to recommend documents, Web pages, publications, jokes or news. Some examples are: SYSKILL & WEBERT, which recommend Web pages [7] or PTV [4] which recommends TV programs to the user.

A collaborative recommendation system is defined as "the system in which recommendations are made based only in the similarity degree between users" [2].

The collaborative recommendation systems are based in the fact the objects a user likes can be liked by other users with similar likings.

IV. PROJECT OBJECTIVES

This investigation's main objective is to solve the information overload problem produced in big learning objects collections.

The information overload problem has been solved in other systems, as for example commercial systems such as Amazon, or entertainment systems, such as Movilens, using recommendation systems. This is why the idea of integrating Recommendation Systems to the distance learning by means of internet services assistance was taken into consideration. Because these systems adapt themselves consistently to the properties an object recommendation processing must fulfil.

A. Stages of the project

The Project has the following stages:

- 1) Develop a prototype in which the users are provided with large learning object collections and state the problem of information overload..
- 2) Develop a prototype using a Recommendation System and check its validity.
- 3) Make a comparison between the algorithm used in the prototype and other types of prototypes used in other environments, looking for the algorithm that better adjusts to an educational environment.
- 4) Make a study of the advantages a Recommendation System has in place of a “Expert System” in education.

V. STAGE 1. DEVELOPMENT OF A PROTOTYPE IN WHICH THE PROBLEM OF INFORMATION OVERLOAD IS CONFIRMED

A. Objectives

The main objectives in stage 1 of the project are:

- 1) To state the problem of the large learning object collections.
- 2) Verify the feasibility for the Recommendation Systems application to the large learning collections in order to solve the problem of information overload.
- 3) Collect data to bring into service a Recommendation System.

B. Methodology

The study has been made with student from “Universidad Pontificia de Salamanca”, both Madrid and Majadahonda campus. 45 students registered in a certain course have been used as reference.

A portal has been developed in which the students have 41 practises of the course at their disposal. The access to the portal is made by user id and password. Once in, the system provides practises by a random method. When a student finishes a practise he must evaluate it so the system can obtain the information we will use in future developments to make recommendations. The student will not be able to do another practise until he evaluates the current one.

VI. OBTAINED RESULTS

The practise portal has been used for two weeks by 86 users, who have done and evaluated 1.178 practises. Figure 1 shows the number of users that have done each of the practises.

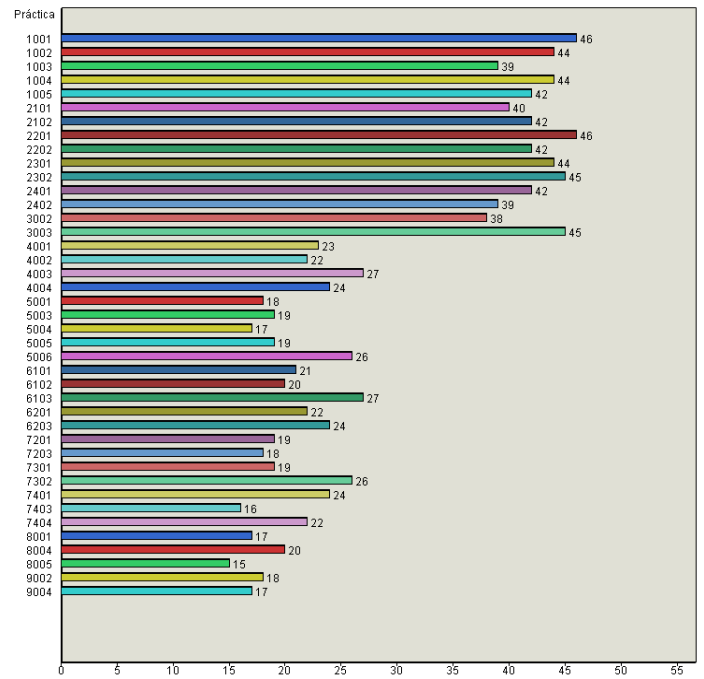


Fig. 1. Number of students that have done each practise

213 of the 415 registered students answered a system use survey. 68 of them had used the system.

The results obtained from the survey show the reason why most of the students did not use the system was they did not know it existed, not that they did not find it useful.

Figure 2 shows a chart with the reasons why the students that did not use the portal did so.

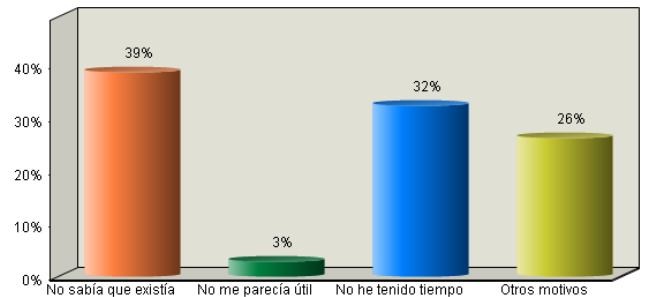


Fig. 2. Why didn't you use the portal of practises?

We have asked the students to mark from 0 to 4 the utility of the system in order to do practises of the course and prepare for the exam. Most of the students which used the system thought it had been useful for their practises and for preparing them for the exam.

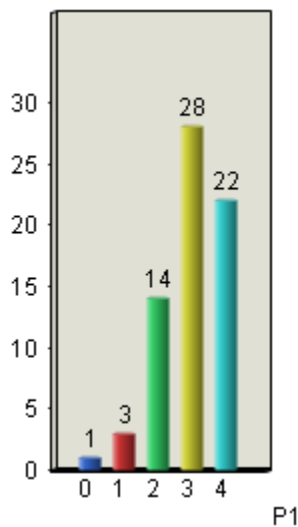


Fig. 3. Did you find useful the portal to do the practises of the course? 0->Not useful at all. 4-> Very useful

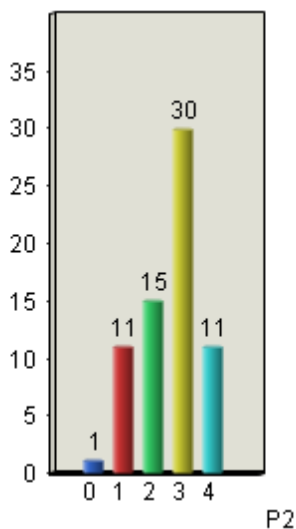


Fig. 4. Did you find useful the portal for preparing you for the exam? 0->Not useful at all. 4-> Very useful

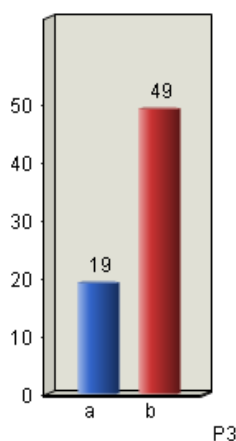


Fig. 5. Would you use a similar platform if you had it available for other courses? a) Yes, but only for courses with practises, b) Yes, I would use it for any course, c) No

All of the students surveyed expressed their wish of having a similar system for other courses including theoretical courses where all that can be offered is bibliography and documentation.

Regarding the number of practises they would be willing to do, most of the students indicated between 20 and 30.

VII. CONCLUSION

The great amount of information that exists in the Internet makes the use of techniques that help the user find what he is looking for necessary. Recommendation Systems are used efficiently to solve the problem of information overload in areas such as electronic commerce and leisure time.

Our investigation shows the problem of the information overload is also present in distance educational environments. The obtained results show most of the users are not willing or can't do all of the practises the system puts at their disposal, that is why they would find help useful in order to decide which practises they should do.

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