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Web based Multimedia Recommendation System for e-Learning Website

Syed Farhan Mohsin
Mohammad Ali Jinnah University, Karachi, Pakistan
Email: farhan_mohsin@hotmail.com

Rizwan Ur Rashid
Mohammad Ali Jinnah University, Karachi, Pakistan
Email: rizwan@jinnah.edu

ABSTRACT

Recommendation systems are playing a vital role for an e-commerce business, which help to protect the customers from information overload. The visitors of such websites need guidance as well as recommendations through which they can find their desired results. Without recommendations it required extra time to get the result. This idea leads to the research on "Multimedia Recommendation System for e-learning website". We proposed an Algorithm using Tag based content search technique, which provide the desired recommendations in the form of text, image, audio and video. In the first phase of the research the recommendations are coming from the same website only.

Keywords: Recommendation System, e-commerce business, Tag based content search technique

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1. Introduction:

The World Wide Web (WWW) is considered as an information hub now a day because it contains huge amount of information and we can access it through different websites. But the storage and display of information and material on a website is not quite enough and specially for e-learner it becomes hectic, hazardous, boring and time consuming because one cannot find or understand the relevant information from the web after spending much of his time in searching its desired information, although the most of the time the website contain the desired information of the user but because of the poor structure of the website or some times by putting so much material on a single page of a website without providing any guidance, the user can not be able to find or catch that information properly and some times the information may be overlook by the user. That's why the user or visitor loses its interest and leaves the website with out getting its desired information.

The tremendous growth of both information and usage has lead to so-called information overload problem in which users are finding it increasingly difficult to locate the right information at the right time. As a response to this problem, much research has been done with the goal of providing users with more proactive and personalized information services [5].

Therefore, it is a common problem for users of the Internet to select or discover information they are interested in. The need to support users with the selection of information or giving reference to relevant information is becoming more important. E-Learners are also in a similar situation like users on the Internet. The amount of available information increases rapidly and confuses the learners which learning activity is most suitable for them.

So there must be a need of such system that guides or help the user in a better way of recommending some tips and url's to find their desired information easily with out spending much time in searching or discovering the whole web site even for a single task. For that reason, Recommendation Systems are becoming increasingly popular for suggesting information to individual users. Recommendation systems have proved to help achieving this goal by using the opinions of a community of users to help individuals in the community more effectively identify content of interest from a potentially overwhelming set of choices. The design of the recommendation system forces the learners to decide which information might be most suitable to their current learning situation. Two recommendation strategies that have come to dominate are content-based and collaborative filtering. Content-based filtering rely on rich content descriptions of the items that are being recommended, while collaborative filtering recommendations are motivated by the observation that we often look to our friends for recommendations.

Volume: 01, Issue: 04, Pages: 217-223 (2010)

The web recommendation is also known as Web personalization and is defined as "provide users with the information they want or need, without expecting from them to ask for it explicitly". Recommendation systems are a useful alternative because they help users to discover items they might not have found by themselves. Interestingly enough, recommendation systems are often implemented using search engines indexing non-traditional data.

The topic of this research web based multimedia recommendation system for e-learning website is dedicated to propose a multimedia recommendation system for e-learners that can provide multimedia recommendations to the needs of an individual user.

Multimedia recommendation system is a new dynamic with so many programs on television and so much multimedia on the Internet there must be something that interests us always available. The volume of information is literally exploding. Not only traditional media but also millions of individual users are putting their own content on the web.

How do an e-learner find content that he is interested in, Isn't there an easier way for that, this research is discovering new ways to solve this problem using the technology of multimedia recommendation system.
Recommendations are formulated either by finding similar users and recommending the things they liked, collaborative filtering, or by finding similar things to the things a user liked before, content-based filtering. Content-based recommendation normally requires machine-learning techniques to find patterns in the things users like. Collaborative filtering requires a statistical technique to match other user profiles to the profile of the things a user has liked.

Many online services that offer publishing and sharing of photos and videos have spawned over the recent years. The famous video website youtube.com is also one of the inspiration of this research work but the youtube.com is providing the recommendations in the form of videos only and it is for general purpose while our proposed recommendation system will provide the recommendations not only in the form of videos but audio, image, presentations and text options are also available in it and it is for e-learning purpose only so that the e-learner can take the full advantage of this facility by improving their knowledge and understandability by using different mediums.

The recognition of video or other multimedia objects are made through metadata or tags. For instance, many sites allow users to add metadata to photos such as title, description and tags. Tags are essentially keywords or terms used to describe a photo and they are typically single words in lower case. For example, a cat photo may be tagged with the term "cat", "kissa" (Finnish word for cat), "kitten", "kitty", "feline", "garfieldthecat", "orange", "rambunctious", etc. The purpose of tagging is to enable text-based retrieval and management of photos; so for example, somebody who wishes to view cat photos can search for all photos with the tag "cats".

2. Related work

In the late 90s, Je® Bezos, CEO of Amazon once said, If I have 3 million customers on the Web, I should have 3 million stores on the Web [21]. Web personalization tailors a user's interaction with the Web information space based on information gathered about them. The recommendation process follows a decision making process that typically ends up with generating dynamic Web content on the y, such as adding hyperlinks to the last web page requested by the user, in order to facilitate access to the needed information on a large website [21] [13] [16]. It is usually implemented on the Web server, and relies on data that reflects the users interest implicitly (browsing history as recorded in Web server logs) or explicitly (user profile as entered through a registration form or questionnaire). The implicit approach is the focus of the work presented in this paper. Personalization can be used to achieve several goals, ranging from increasing customer retention and loyalty on e-commerce sites [21] to enabling better search by making results of Web information retrieval/search more aware of the context and user interests [10]. In addition, personalization can help convert browsers into buyers, increase cross-sell by recommending items related to the ones being considered, improve web site design and usability, help visitors to quickly and relevant information on a large website, and more generally help businesses maintain a more effective Customer Relationship Management (CRM) [7].

Recommender systems have already found some success in real e-commerce applications such as Amazon [12] and CDNow [1], where they are used to recommend to online shoppers, products and services that they might otherwise never discover on their own. There have also been several pioneering research system prototypes, such as Syskill and Webert [18], PHOAKS [24], Fab [3], and GroupLens [11] [20]. Recommender systems can be classified in a variety of ways [21] [17] [4] depending on their inputs and on the recommendation algorithm used, including: Content-based or Item-based filtering: Content-based filtering systems recommend items to a given user, which are deemed to be similar to the items that the same user liked in the past. Item similarity is typically based on domain specific item attributes (such as author and subject for book items, artist and genre for music items). Classical examples include Syskill and Webert [18], and Fab[3].

Collaborative filtering: Based on the assumption that users with similar past behaviors (rating, browsing, or purchase

history) have similar interests, a collaborative filtering system recommends items that are liked by other users with similar interests [21]. This approach relies on a historic record of all user interests such as can be inferred from their ratings of the items on a website (products or web pages). Rating can be explicit (explicit ratings, previous purchases, customer satisfaction questionnaires) or implicit (browsing activity on a website or click streams).

Collaborative filtering methods are completely independent of the intrinsic properties of the items being rated or recommended. In particular, items that may be hard to describe using attributes, such as video, audio and images, as well as semantically rich text data can still be recommended based on latent similarities that are only captured through the social process of collaborative filtering, hence, often suggesting completely new types of items that are different from, and yet associated with previously rated items.

Knowledge Engineering or Rule-based filtering: In this approach, used frequently to customize products on e-commerce sites such as Dell on Line, the user answers several questions, until receiving a customized result such as a list of products. Demographic recommendation systems: In this approach, items are recommended to users based on their demo-graphic attributes. The recommendations can be based on handcrafted stereotypes derived from marketing re-search or on machine learning techniques [17] that learn to predict users' preferences from their demographic attributes. Hybrids: Each recommendation strategy has its own strengths and weaknesses. Hence, combining several recommendation strategies can be expected to provide better results than either strategy alone [17][4]. Most hybrids work by combining several input data sources or several recommendation strategies.

Recommendation systems are designed either based on content-based filtering or collaborative filtering. Both types of systems have inherent strengths and weaknesses, where content-based approaches directly exploit the product information, and the collaboration filtering approaches utilize specific user rating information. Content-based filtering approaches are derived from the concepts introduced by the Information Retrieval (IR) community. Content-based filtering systems are usually criticized for two weaknesses:

1. Content limitation: IR methods can only be applied to a few kinds of content, such as text and image, and the extracted features can only capture certain aspects of the content.

2. Over-specialization: Content-based recommendation system provides recommendations merely based on user profiles. Therefore, users have no chance of exploring new items that are not similar to those items included in their profiles.

3. Methodology

Our multimedia web based recommendation system for e-learner consists of two phases. In first phase the multimedia recommendations are coming from our own website, means all the recommendations are based on the data present on our e-learning website, while in second phase the multimedia recommendations are coming from the entire web. The implementation of this proposal will cover the first phase recommendations only and the second phase is treated as a future work.

The commonly used existing recommendations techniques are Collaborative filtering technique, which uses other user's rating value with similar preference, Content-based filtering technique, which compare user profile and product description, Item-based filtering technique, which analyze association among products and Rule-based filtering technique, which uses demographic information.

In our proposed system we have introduce a tag based content filtering technique along with number of hits on the object, the number of hits of any object shows that how many times that object has been viewed, so in the final result the object is filtered through tag based searching and the result is shown in descending order i.e those items or objects are shown first those have greater number of hits.

In our proposed web based recommendation system for e-learner the recognition of video and other multimedia objects are made through metadata, tags or titles. For instance, many sites allow users to add metadata to photos such as title, description and tags. Tags are essentially keywords or terms used to describe a photo or any other multimedia object and they are typically single words in lower case. For example, a cat photo may be tagged with the term "cat", "lissa" (Finnish word for cat), "kitten", "kitty", "feline", "garfieldthecat", "orange", "rambunctious", etc. The purpose of tagging or titling is to enable text-based retrieval and management of photos and other multimedia objects, so for example, somebody who are viewing cat photos can get the multimedia recommendations for all the objects with the tag "cats" present in the website.

4. Hits Algorithm

The hits algorithm is used to increment one(1) in the sum of the hits of that particular object, every time the object is hit, the sum of hits of that object is increment with one & after tag based search the result shows in descending order of hits, i.e those objects are shown first which have greater number of hits. In programming language we can write this algorithm as:

$$a=a+1 \quad \text{or} \quad a{+}{+}$$

Where 'a' contains the sum of hits & it is incremented by 1, while in stats we can write this algorithm as

$$\sum_{i=1}^{n}$$

Volume: 01, Issue: 04, Pages: 217-223 (2010)

Where 'n' is the upper bound and 'i' is the lower bound, which is 1, means every time the sum is incremented by 1. We have tried to explain the working of our web based recommendation system for e-learner through snapshots below:

The fig 1(a) below shows the Admin Login Screen for "Web based Multimedia Recommendation System for e-Learning Website", from where the admin can enter their user id and password to enter into the admin area of the website.

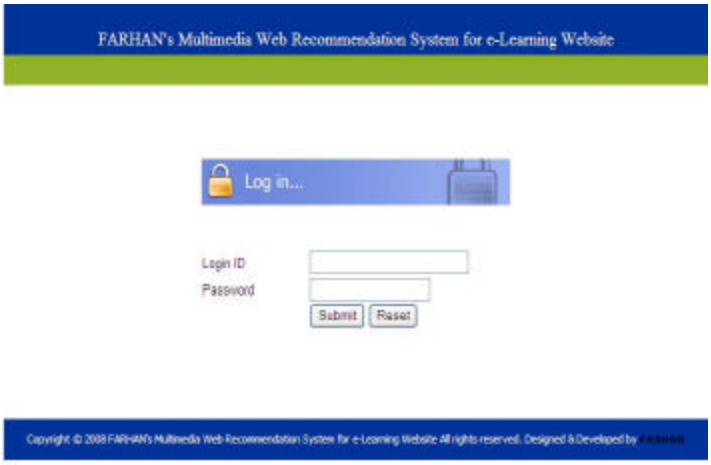

Fig 1(a)

The fig 1(b) below shows the Add/Edit title Screen for "Web based Multimedia Recommendation System for e-Learning Website", from where the admin can enter the new title, contents for the website or also can edit the previous title, contents of the website.

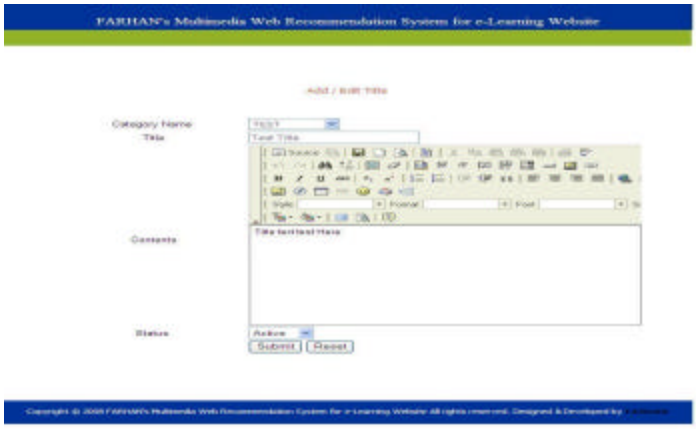

Fig 1(b)

The fig 1(c) below shows the View title Screen for "Web based Multimedia Recommendation System for e-Learning Website", from where the admin can view all the listing of the previously entered title along with category and status of the title and also have edit and delete icons from where the admin can edit or delete the titles from the admin area of the website.

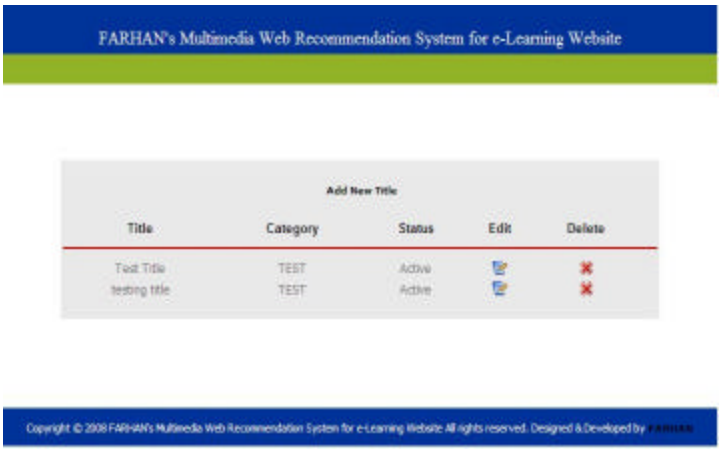

Fig 1(c)

The fig 2(a) below shows the add/edit category screen for "Web based Multimedia Recommendation System for e-Learning Website", from where the admin can add the different new categories and also update the previously added categories.

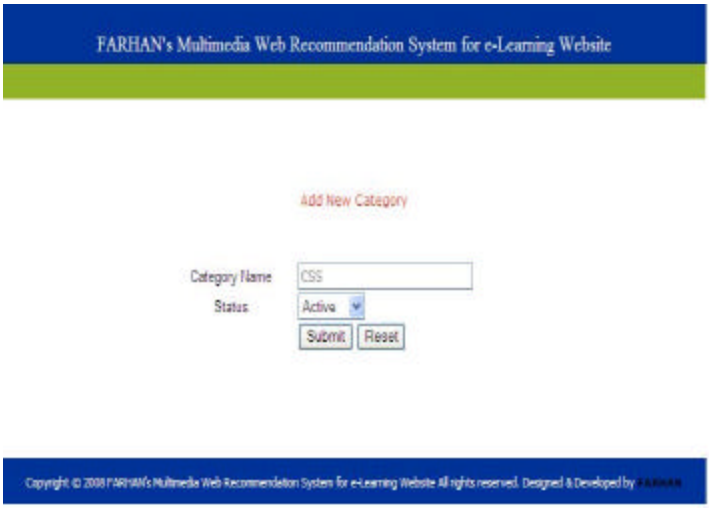

Fig 2(a)

The fig 2(b) below shows the view category screen for "Web based Multimedia Recommendation System for e-Learning Website", from where the admin can view all the listing of the previously entered categories along with status of the category and also have edit and delete icons from where the admin can edit or delete the categories from the admin area of the website, also have a add new link which will lead to the add new categories.

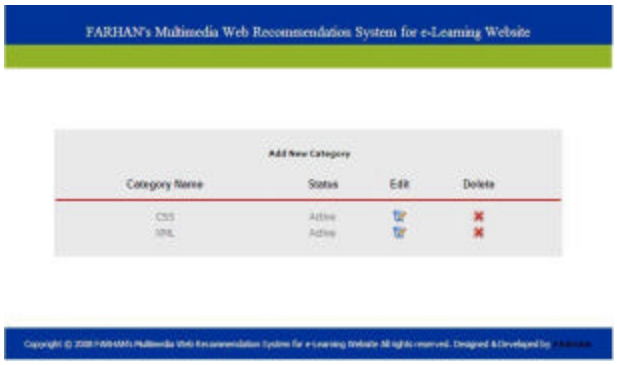

Fig 2(b)

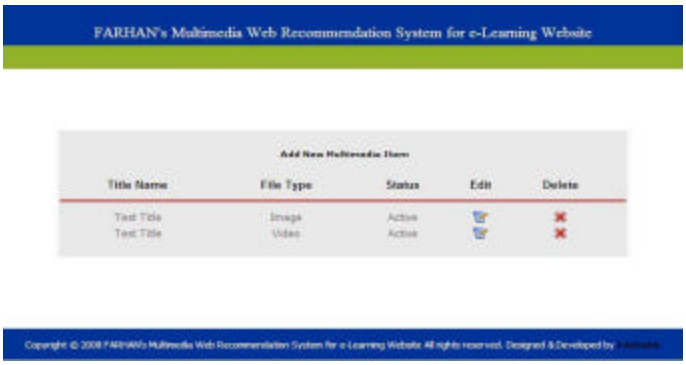

Fig 3(b)

The fig 3(a) below shows the add new multimedia file screen for "Web based Multimedia Recommendation System for e-Learning Website", from where the admin can add the different types of multimedia files of the particular topic or title, currently the supported multimedia file types are audio, video, images, pdf & ppt which can be add from the screen shown below.

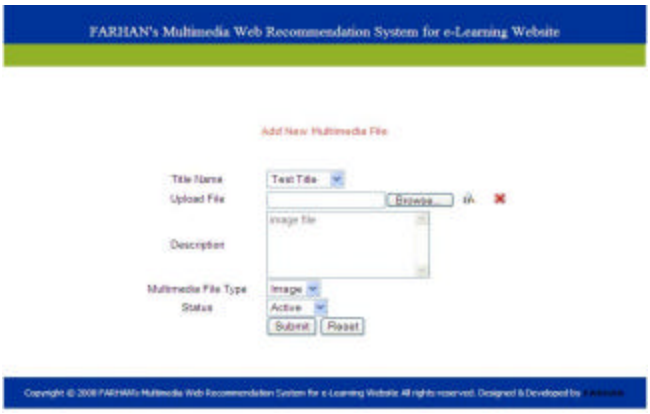

Fig 3(a)

The fig 3(b) below shows the view multimedia files screen for "Web based Multimedia Recommendation System for e-Learning Website", from where the admin can view all the listing of the previously entered multimedia files along with title, file type and status of the file and also have edit and delete icons from where the admin can edit or delete the files from the admin area of the website, also have a add new link which will lead to the add new multimedia file screen.

The fig 4(a) above shows the front view or index page of the "Web based Multimedia Recommendation System for e-Learning Website", title is present on the top of the page in header format, while the navigation and categories are present on the left hand side, on clicking the categories the related or requested material is opened, bottom of the page contains the multimedia recommendations which the theme of this research, initially when the users enters on the site first time it shows the most viewed or top rated recommendations available on the system, when user clicks on any related or desired categories the multimedia recommendations are shown on the basis of title or tags present on the page the user can view the different multimedia files along with title, and can select or play the desired recommendations, and in this way the users get the related info or files with out wasting any time on

searching on the site or on the web, this feature will safe the time of the e-learner and also keep the interest of the e-learner on the site.

5. Conclusion & Future work

In this research, a new idea "Web based Multimedia Recommendation system for e-learning website" is proposed in the field of web recommendations; the theme of the research is to provide the recommendations to e-learner while visiting the e-learning website in the form of text, image, audio or video. Because the visitors of such website needs guidance and recommendations through which they can find their desired topics, understand and cover their topics and courses in a better and efficient way without spending much of their time in searching the whole website or all over the web. We have implemented a search technique based on the title or tags of the topic through which the recommendations are generated. Currently this system provides the recommendations from the data present on our e-learning website only but the future work based on the implementation of the proposed system on gathering the recommendations from the entire web.

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Authors Biography:

Syed Farhan Mohsin has completed his MS in Computer Science from Mohammad Ali Jinnah University in year 2009. He is **currently** working in Masterkey Systems as a Software Engineer. His current research is based on web based multimedia recommendation system.

Mr. Rizwan Ur Rashid is an Associate Professor at Mohammad Ali Jinnah University in the Department of Computer Science. Before MAJU Mr. Rashid was Senior Faculty Member at PAFKIET; He was Adjunct Faculty Member at CBM, SZABIST & Bahria Universities. He has vast experience of teaching, corporate trainings/consulting of similar nature in the past. Mr. Rashid holds an MS in Computer Science from NED University and MIBM(Master Industrial Business Mathematics) from Karachi University .He has throughout First Division in his academic career. Mr. Rashid attended various Courses from National & International workshops, seminars &Conferences.