Improvement of Website Structure for Effective User Navigation

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ABSTRACT

Websites effectiveness depends on their content and usability needs of their users. Websites are developed by developers, who has own mind set. Websites are developed using requirements rather than providing user friendliness. The expansion of the Internet has led to several studies on getting better user navigations with information extracted from web server logs and they are normally categorized in to approaches of web personalization as well as web transformation. Web personalization is procedure of tailoring web pages to needs of precise users by means of information of users' navigational behavior as well as profile information. Designing well-structured websites to facilitate effective user navigation has long been a challenge. A primary reason is that the web developers' understanding of how a website should be structured can be considerably different from that of the users. While various methods have been proposed to re link web pages to improve navigability using user navigation data, the completely reorganized new structure can be highly unpredictable, and the cost of disorienting users after the changes remains unanalyzed. This paper addresses how to improve a website without introducing substantial changes.

Keywords— Web server; Information systems; User navigation; Web personalization; web patterns

Introduction

In today's environment it is imperative to go online for variety of reasons as all the things that an individual would want to achieve has to have online solution. As such is the present day situation software industry, specially the web developers are needed to work extensively on such a need of the everyday internet user. For some users using the net is part and parcel of their job and they cannot do without websites that are of their interest. E-commerce websites are the best example of this category since all the business of the company is wholly and solely dependent on their website performance.

Web mining techniques are used to analyze web resource details. Content mining, structure mining and usage mining are the main types of web mining [13]. Web page contents are analyzed in the content mining process. Structure mining technique is used to analyze the web site and page layouts. User access details are analyzed using usage mining methods. Web site structures are altered to improve the user navigations. Web

personalization method reconstructs the page links with reference to the traversal path and profile of a particular user. Transformation mechanism is applied to modify the site structure for all users.

A most important cause of poor website design is that the web developers' perceptive of how a website should be structured and can be considerably different from those of the users. Such differences result in cases where users cannot easily find the desired information in a website. This issue is difficult to handle because when creating a website, web developers may not have a clear under-standing of users' preferences and can only organize pages based on their own ideas. However, the measure of website effectiveness should be the satisfaction of the users rather than that of the developers [2]. Thus, WebPages should be organized in a way that generally matches the user's model of how pages should be organized Therefore The problem of improving user navigation on a website with minimal changes to the current structure, is an important issue.

The common approach to improve navigation is restructuring website but it is not good approach. User may lose interest because of familiarness caused by restructuring of a website. It is important to increase efficiency of a navigation keeping original structure intact. The reason of a poor navigation of a website is developed by developers understanding and views. Most of the times there is communication gap between developer and actual user.

The information which is important for user that is may not be important in views of developer. User get frustrate if the information required is not found in minimum attempt. So website should be able to find required information with minimum navigation. Previous studies have found different issues on websites. In our work we are suggesting solution to improve website navigation. There are different studies have made to improve the efficiency of navigation. Those studies suggest transformation of website. Transformation approach most of time require reorganization of whole website [3]. Reorganization of website results into difficulty for a familiar user, distract user from website, loose business, reduce Usability.

Our model can improve the navigation of user with minimum changes, and it can be effectively solved. We define two evaluation metrics and use them to check the performance of the improved website using the real data set. Evaluation results show that the navigation of user on the improved structure is greatly increased. In this case, we get to know that heavily disoriented users can get benefit from the well developed structure than the less disoriented users.

Related work

The growth of the Internet has led to numerous studies on improving user navigations with the knowledge mined from web server logs and they can be generally categorized in to web personalization and web transformation approaches. Web personalization is the process of "tailoring" web pages to the needs of specific users using the information of the users' navigational behavior and profile data [9]. Perkowitz and Etzioni describe an approach that automatically synthesizes index pages which contain links to pages pertaining to particular topics based on the co-occurrence frequency of pages in user traversals, to facilitate user navigation. The methods proposed by Mobasher et al. and Yan et al. create clusters of users profiles from weblogs and then dynamically generate links for users who are classified into different categories
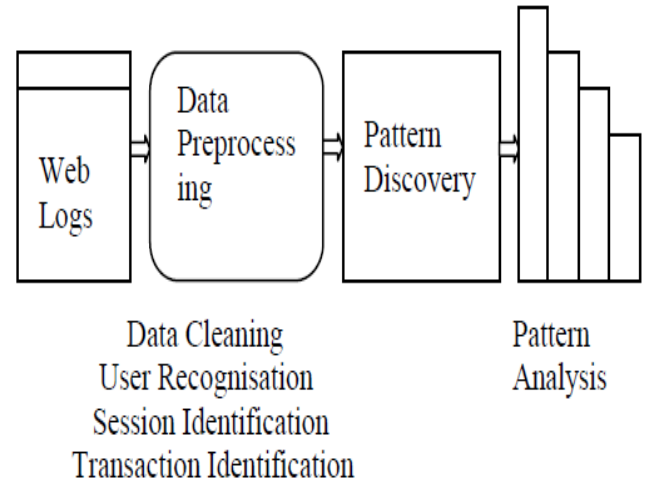
based on their access patterns. Nakagawa and Mobasher develop a hybrid personalization system that can dynamically switch between recommendation models based on degree of connectivity and the user's position in the site.

There are several remarkable differences between web transformation and personalization approaches. They are transformation approaches create or modify the structure of a website used for all users, while personalization approaches dynamically reconstitute pages for individual users. Hence, there is no predefined/built-in web structure for personalization approaches [1].

a. Knowledge discovery from web logs:

Calculating the Web access logs would help in predicting the behavior of user and preparing the web structure. By considering the applications point of view, information extracted from web usage patterns can be applied to work out activities related to e-business, e-services, e-education, and on-line communities and so on. But On the other side, there is tremendous increase in the density of data and its size. So the information supplied by current web log file analysis tools may facilitate insufficient information and hence more intelligent mining techniques are needed.

For the purpose of web usage mining, web log files play an important role. The information and knowledge that can be collected from web log files is the navigation pattern of user. Different users have associated different navigational patterns with them. It is not easy to obtain such knowledge, because the users are continuously changing their focus. User can use the navigation pattern knowledge for two purposes: To help users by predicting their future request and for the personalization of websites [5, 6].

Data Cleaning
User Recognisation
Session Identification
Transaction Identification

Pattern Analysis

b. An empirical study of web site navigation structure's impact on web site usability.

Web sites are intended to facilitate knowledge acquisition, often in the interest of supporting decision making. Based on taxonomy of factors influencing Web site usability, hypotheses are developed about usability of alternative navigation structures. These hypotheses are tested via experiments that measure user performance in accomplishing knowledge acquisition tasks and user perceptions of usability. Two rounds of experimentation are performed for both simple and relatively complex task sets [3]. Results show that a usage-oriented hierarchy or a combined hierarchy is a navigation structure associated with significantly higher usability than subject-oriented hierarchies, for both simple and relatively complex knowledge acquisition tasks.

c. Web metrics:

A broad range of set of Web metrics [12] are considered in this paper. For quantification of web graph properties, web page significance, web page resemblance, search and retrieval, usage characterization and information theoretic properties, we introduce origins, measurement functions, formulations and comparison of familiar Web metrics. So

for enhancing web data access and its use these metrics can be used [12].

Proposed system

Association rule mining process:

A number of data mining algorithms have been introduced to the community that perform summarization of the data, classification of data with respect to a target attribute, deviation detection and other forms of data characterization and interpretation. One popular summarization and pattern extraction algorithm is the association rule algorithm, which identifies correlations between items in transactional databases. Given a set of transactions, each described by an unordered set of items, an association rule Y X – may be discovered in the data, where X and Y are conjunctions of items. The intuitive meaning of such a rule is that transactions in the database, which contain the items in X, tend to also contain the items in Y. An example of such a rule might be many observed customers who purchase tires and auto accessories also buy some automotive services. In this case, X = {tires, auto accessories} and Y = {automotive services}. Two numbers are associated with each rule that indicates the support and confidence of the rule. The supports of the rule X -Y represents the percentage of transactions from the original database that contain both X and Y. The confidences of rule X-Y represents the percentage of transactions containing items in X that also contain items in Y. Applications of association rule mining include cross marketing, attached mailing, catalog design and customer segmentation . An association rule discovery algorithm searches the space of all possible patterns for rules that meet the user -specified support and confidence thresholds [8]. The problem of discovering association rules can be divided into two steps:

Find all item sets whose support is greater than the specified threshold. Item sets with minimum support are called frequent item sets. Generate association rules from the frequent item sets. To do this, consider all partitioning of the item set into rule left -hand and right -hand sides. Confidences of a candidate rule X - Y is calculated as support (XY) / support (X). All rules that meet the confidence threshold are reported as discoveries of the algorithm.
L1: = {frequent 1 - itemsets};
k:= 2; // k represents the pass number
While (Lk - 1)
Ck = New candidates of size k generated from Lk – 1 For all transactions t.

A mathematical programming (MP) model to improve the navigation efficiency of a website while reducing changes to its original. The following contributions would hopefully better the overall performance of the websites in general. Firstly, the problem of improving user navigation on a website with minimal changes to it's current structure. Mathematical programming (MP) model which not only successfully, accomplishes the task but also generates the optimal solutions surprisingly fast. Secondly, we model the out-degree as a cost term in the objective function instead of as hard constraints [11]. This allows a page to have more links than the out-degree threshold if the cost is reasonable and hence offers a good balance between minimizing alterations to a website and reducing information overload to users. Thirdly, we propose two evaluation metrics and use them to assess the improved structure to confirm the validity of our model. The evaluation procedure that, we propose to develop will provide a framework for evaluating website structures in an efficient manner.

Conclusion

Companies, organizations and individuals alike are increasingly gathering information for their best interest. This is done by way of, efficient web mining function which along with

effective data extraction algorithm enhances the overall website performance. There is a need to everyday improve the efficiency and the performance of a website in general. New methods need to be adopted and integrated within the framework of any website in particular to enhance its overall response. In this survey we have studied such various methods that can be implemented for enhancing the website efficiency we also present a more effective way forward in this regard through this paper.

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