ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Effective User Navigation through Website Structure Improvement

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ABSTRACT:

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. Specifically, we propose a mathematical programming model to improve the user navigation on a website while minimizing alterations to its current structure. Results from extensive tests conducted on a publicly available real data set indicate that our model not only significantly improves the user navigation with very few changes, but also can be effectively solved. In addition, we define two evaluation metrics and use them to assess the performance of the improved website using the real data set. Evaluation results confirm that the user navigation on the improved structure is indeed greatly enhanced. More interestingly, we find that heavily disoriented users are more likely to benefit from the improved structure than the less disoriented users.

Index Terms:

Website design, user navigation, web mining, mathematical programming

INTRODUCTION:

THE advent of the Internet has provided an unprecedented platform for people to acquire knowledge and explore information. There are 1.73 billion Internet users worldwide as of September 2009, an increase of 18 percent since 2008 .The fast-growing number of Internet users also presents huge business opportunities to firms. According to Grau, the US retail e-commerce sales (excluding travel) totaled $127.7 billion in 2007 and will reach $218.4 billion by 2012.

In order to satisfy the increasing demands from online customers, firms are heavily investing in the development and maintenance of their websites. InternetRetailer reports that the overall website operations spending increased in 2007, with one-third of site operators hiking spending by at least 11 percent, compared to that in 2006. Despite the heavy and increasing investments in website design, it is still revealed, however, that finding desired information in a website is not easy [4] and designing effective websites is not a trivial task .

Galletta et al. indicate that online sales lag far behind those of brickand- mortar stores and at least part of the gap might be explained by a major difficulty users encounter whenbrowsing online stores. Palmer highlights that poor website design has been a key element in a number of high profile site failures. McKinney et al. also find that users having difficulty in locating the targets are very likely to leave a website even if its information is of high quality.

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A primary cause of poor website design is that the web developers' understanding of how a website should be structured can be considerably different from those of the users .Such differences result in cases where users cannot easily locate the desired information in a website. This problem is difficult to avoid because when creating a website, web developers may not have a clear understanding of users' preferences and can only organize pages based on their own judgments.

However, the measure of website effectiveness should be the satisfaction of the users rather than that of the developers. Thus, Webpages should be organized in a way that generally matches the user's model of how pages should be organized.Previous studies on website has focused on a variety of issues, such as understanding web structures finding relevant pages of a given page mining informative structure of a news website and extracting template from webpages Our work, on the other hand, is closely related to the literature that examines how to improve website navigability through the use of user navigation data.

Various works have made an effort to address this question and they can be generally classified into two categories to facilitate a particular user by dynamically reconstituting pages based on his profile and traversal paths, often referred as personalization, and to modify the site structure to ease the navigation for all users, often referred as transformation.

Existing System:

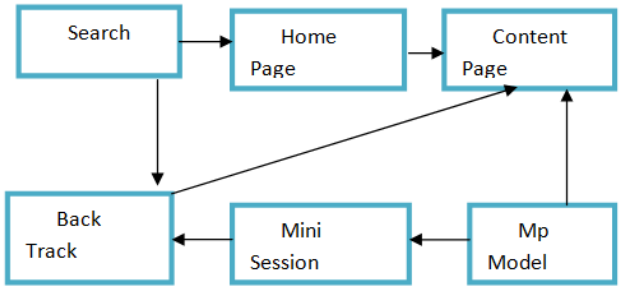
A primary cause of poor website design is that the web developers' understanding of how a website should be structured can be considerably different from those of the users. Such differences result in cases where users cannot easily locate the desired information in a website. This problem is difficult to avoid because when creating a website, web developers may not have a clear understanding of users' preferences and can only organize pages based on their own judgments.

However, the measure of website effectiveness should be the satisfaction of the usersrather than that of the developers. Thus, Web pages should be organized in a way that generally matches the user's model of how pages should be organized.

Proposed System:

we propose a mathematical programming model to improve the user navigation on a website while minimizing alterations to its current structure. Results from extensive tests conducted on a publicly available real data set indicate that our model not only significantly improves the user navigation with very few changes, but also can be effectively solved. In addition, we define two evaluation metrics and use them to assess the performance of the improved website using the real data set. Evaluation results confirm that the user navigation on the improved structure is indeed greatly enhanced. More interestingly, we find that heavily disoriented users are more likely to benefit from the improved structure than the less disoriented users.

Architecture:



MODULES:

1.Web Personalization.
2.Web Transformation.
3.Maximal Forward Reference.
4.Mini Sessions.
5.Out-Degree Threshold.

Modules Description:

1.Web personalization:

Web personalization is the process of "tailoring" webpages to the needs of specific users using the information of the users' navigational behavior and profile data. 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.

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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.

2.Web transformation:

Web transformation, on the other hand, involves changing the structure of a website to facilitate the navigation for a large set of users instead of personalizing pages for individual users. Fu et al. describe an approach to reorganize web pages so as to provide users with their desired information in fewer clicks.

However, this approach considers only local structures in a website rather than the site as a whole, so the new structure may not be necessarily optimal. Gupta et al. propose a heuristic method based on simulated annealing to relink web pages to improve navigability. This method makes use of the aggregate user preference data and can be used to improve the link structure in websites for both wired and wireless devices.

3. Maximal Forward Reference:

We use backtracks to identify the paths that a user has traversed, where a backtrack is defined as a user's revisit to a previously browsed page. The intuition is that users will backtrack if they do not find the page where they expect it .

Thus, a path is defined as a sequence of pages visited by a user without backtracking, a concept that is similar to the maximal forward reference defined in Chen et al. Essentially, each backtracking point is the end of a path. Hence, the more paths a user has traversed to reach the target, the more discrepant the site structure is from the user's expectation.

4.Mini Sessions :

Recall that a mini session is relevant only if its length is larger than the corresponding path threshold. Consequently, only relevant mini sessions need to be considered for improvement and this leads to a large number of irrelevant mini sessions (denoted as TI) being eliminated from consideration in our MP model.

5.Out-Degree Threshold:

Web pages can be generally classified into two categories : index pages and content pages. An index page is designed to help users better navigate and could include many links, while a content page contains information users are interested in and should not have many links. Thus, the out-degree threshold for a page is highly dependent on the purpose of the page and the website. Typically, the out degree threshold for index pages should be larger than that for content pages.

System Configuration:

H/W System Configuration:

Processor - Pentium –III

Speed	- 1.1 Ghz
RAM	- 256 MB (min)
Hard Disk	- 20 GB
Floppy Drive	- 1.44 MB
Key Board	- Standard Windows Keyboard
Mouse	- Two or Three Button Mouse
Monitor	- SVGA

S/W System Configuration:

* Operating System :Windows95/98/2000/XP
* Application Server : Tomcat5.0/6.X
* Front End : HTML, Java, Jsp
* Scripts : JavaScript.
* Server side Script : Java Server Pages.
* Database : Mysql
* Database Connectivity : JDBC.

CONCLUSION:

In this paper, we have proposed a mathematical programming model to improve the navigation effectiveness of a website while minimizing changes to its current structure, a critical issue that has not been examined in the literature.

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Our model is particularly appropriate for informational websites whose contents are relatively stable over time. It improves a website rather than reorganizes it and hence is suitable for website maintenance on a progressive basis. The tests on a real website showed that our model could provide significant improvements to user navigation by adding only few new links. Optimal solutions were quickly obtained, suggesting that the model is very effective to real world websites. In addition, we have tested the MP model with a number of synthetic data sets that are much larger than the largest data set considered in related studies as well as the real data set. The MP model was observed to scale up very well, optimally solving large-sized problems in a few seconds in most cases on a desktop PC.

To validate the performance of our model, we have defined two metrics and used them to evaluate the improved website using simulations. Our results confirmed that the improved structures indeed greatly facilitated user navigation. In addition, we found an appealing result that heavily disoriented users, i.e., those with a higher probability to abandon the website, are more likely to benefit from the improved structure than the less disoriented users.

Experiment results also revealed that while using small path thresholds could result in better outcomes, it would also add significantly more new links.Thus, Webmasters need to carefully balance the tradeoff between desired improvements to the user navigation and the number of new links needed to accomplish the task when selecting appropriate path thresholds. Since no prior study has examined the same objective as ours, we compared our model with a heuristic instead. The comparison showed that our model could achieve comparable or better improvements than the heuristic with considerably fewer new links.

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Good Teachers are worth more than thousand books, we have them in Our Department.

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