International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2014): 5.611

A Survey on Web Navigation Usability by Web Structure Modification with the Help of Actual and Anticipated Usage Comparison

Jadhav Utkranti U.[1], A. R. Dani[2]

[1]Master Of Computer Engg, Savitribai Phule Pune University, G. H. Raisoni Collage of Engg and Technology, Wagholi, Pune, India

[2]Professor of Computer Engineering Department, Savitribai Phule Pune University, G. H. Raisoni Collage of Engg and Technology, Wagholi, Pune, India

Abstract: ***The Internet has evolved significantly over the past few decades. There are many reasons behind this explosive growth in web traffic. Just about every website has some form of navigation. Unfortunately, not every website navigation is good. Most of the time, website navigation is put together by Web designers who know a lot about making decorated websites, but very little about marketing a website or creating a website built from the users point of view, which results into web navigation usability problems for users. This survey paper "Enhancing web navigation usability using web usage mining techniques" discusses in detail about developing solution model to identify Web navigation related usability problems and analyze comparison between actual and anticipated usage behavior which will be helpful to users to provide better effectiveness (higher task completion rate) and efficiency (less time) for given tasks. The web navigation structure is changed automatically which reduces the time expended by the web developers.***

Keywords: Cognitive user model, sessionization, software tool, test oracle, usability, usage pattern, Web server log.

1. Introduction

The World Wide Web today has expanded to serve millions of different users for a multitude of purposes in all parts of the world. Naturally, Web content nowadays needs to be filtered and personalized based on the particular needs of individual users. The users interests, expectations and expertise, cognitive style and perception are some of the factors that need to be considered when creating personalized interactive systems.

Web navigation refers to the process of navigating a network of information resources in the World Wide Web, which is organized as hypertext or hypermedia. Just about every website has some form of navigation. Unfortunately, not every website navigation is good. Most of the time, a website navigation is put together by Web designers who know a lot about making pretty websites, but very little about marketing a website or creating a website built from the users' point of view. Therefore, it is necessary to identify navigation-related Web usability problems which will be helpful to user's to provide better effectiveness (higher task completion rate) and efficiency (less time for given tasks). One of the greatest advantages of designing web-based user interfaces over traditional user interfaces is the ability to keep track of user interactions with the site. Thanks to the simple (yet extremely useful) concept of server log files, user's interaction with a website is kept in a raw format that can be easily processed by automated tools. This information is stored on most web servers by default. Statistical testing and reliability analysis be used effectively to assure quality for Web applications. Web usage and failure information extracted from existing Web logs. The usage information is used to build models for statistical Web testing. The related failure information is used to measure the reliability of Web applications and the potential effectiveness of statistical Web testing.

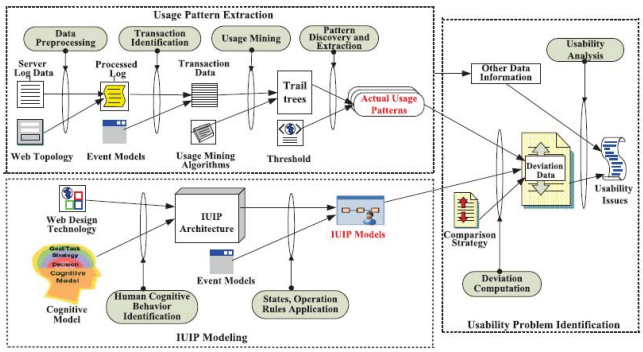

Figure: Architecture of a new method for identifying usability problems

The architecture includes three major modules: Usage Pattern Extraction, IUIP Modeling, and Usability Problem Identification. First, we extract actual navigation paths from server logs and discover patterns for some typical events. In parallel, we construct IUIP models for the same events. IUIP models are based on the cognition of user behavior and can represent anticipated paths for specific user-oriented tasks. The result checking employs the mechanism of test oracle.

Web Usage mining applies data mining technique to extract knowledge from these web log files. Additionally, various tools can be used to extract the information from these raw log files. The extracted information can then be used for finding user navigation patterns. By finding frequent user navigation sequences or user navigation sessions from server logs, we can compare actual user navigation trails with the designer's expected navigation trails and try to improve the interface of the site accordingly.

2. Literature Survey

In this section, the references are collected from all conferences, sites, articles, books from internet which helps to implement the project. For development of this project we referred some of Base papers, Ideas which helps in development, testing, and in deployment phase. For good understanding of the web mining concepts there are some books for reference.

1) Ruili Geng & Jeff Tian members of IEEE have proposed a transaction paper on "Improving Web Navigation Usability by Comparing Actual & Anticipated Usage" which is the main base paper of project. The paper is all about identifying navigation related web usability problems faced by user after comparisons between actual and anticipated usage patterns. Based on these comparison results (performed on small service-oriented website) they have highlighted usability issues and suggested corrective actions to be performed by domain experts (manually).

2) Liu and his team wrote a book "Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data". The chapter 6-12 of this book describes all basic concepts related to web specific mining.

3) R. Cooley, B. Mobasher, and J. Srivastava, proposed a paper on knowledge information system, "Data preparation for mining World Wide Web browsing patterns" which explains basic concept of Web Usage Mining. Also this paper presents several data preparation techniques in order to identify unique users' and user sessions. Also, a method to divide user sessions into semantically meaningful transactions is defined and successfully tested against two other methods. Transactions identified by the proposed methods are used to discover association rules from real world data using the WEBMINER system.

4) OM Kumar C. U. and P. Bhargavi published an article on "Analysis of web server log by web usage mining for extracting users' patterns" , In this paper they described The Web Server Log files and use of Web mining techniques to extract usage patterns by using WEKA(A Software tool).

5) C. P. Sumathy, R. Padmaja Valli, T. Santhanam published an article on "An overview of pre-processing of web log files for web usage mining", where they discusses problems with data stored in the log files do not present in an accurate picture of the users' accesses to the Web site. Hence, pre-processing of the Web log data is an essential and pre-requisite phase before it can be used for knowledge-discovery or mining tasks.

6) T. Arce, P. E. Roman, J. D. Velasquez, and V. Parada published a paper "Identifying web sessions with simulated annealing" on Expert System Application where they discusses how web site redesigning stage is compulsory to take into account the behavior of the users. Here they have proposed heuristic approach based on simulated annealing to solve the sessionization problem.

7) Nirali Honest and Dr. Atul Patel, Dr. Bankim Patel proposed an IEEE conference paper on "A study of path completion techniques in web usage mining". They proposed work on path completion by considering different types of path generated in accessing the website designed using content management system and gives a novel algorithm to form the path.

8) Mr. Akshay Upadhyay, Mr. Balram Purswani published a paper for International Journal of Scientific and Research Publications on "Web Usage Mining has Pattern Discovery" where they proposed knowledge in respect of pattern discovery of web usage mining, also they described how Users behavior of page browsing should be in hand with the website designers and study about the visitor's activities through the web analysis and find patterns of the visitor's activities.

9) Melody Y. Ivory and Marti A. Hearst published an article on "The State of the Art in Automating Usability Evaluation of User Interfaces" where they proposed extensive survey of usability evaluation methods, organized according to a new taxonomy that emphasizes the role of automation. The survey analyzes existing techniques, identifies which aspects of usability evaluation automation are likely to be of use in future research, and suggests new ways to expand existing approaches to better support usability evaluation.

10) M. Heinath, J. Dzaack, and A. Wiesner published a paper on "Simplifying the development and the analysis of cognitive models " in cognitive science conference where they proposed drawbacks of cognitive processes and their underlying structures and given solution to these problems by developing HTAmap and SimTrA to simplify the development and analysis of cognitive models.

11) Tonio Carta, Fabio Paterno, and Vagner Figueredo de Santana1 published article on "Web Usability Probe: A Tool for Supporting Remote Usability Evaluation of Web Sites" on springer. They presented a tool that supports remote usability evaluation of Web sites. The tool considers client-side data on user interactions and JavaScript events. In addition, it allows the definition of custom events, giving evaluators the flexibility to add specific events to be detected and considered in the evaluation. The tool supports evaluation of any Web site by exploiting a proxy-based architecture and enables the evaluation to perform a comparison between actual user behavior and an optimal sequence of actions.

12) T. Tullis and B. Albert wrote a book "Measuring the User Experience: Collecting, Analyzing, and Presenting Usability Metrics (Interactive Technologies)" which covers all aspects of someone's interaction with a product, application, or system. Also it says that user experience is measurable or quantifiable. Also it describes usability issues, various user experience metrics.

3. Conclusion

Finally we conclude that a new method for the identification and improvement of navigation-related Web usability problems by checking extracted usage patterns against cognitive user models. As demonstrated by our case study, our method can identify areas with usability issues to help improve the usability of Web systems. The usability improvement in successive iterations can be quantified by the progressively better effectiveness (higher task completion rate) and efficiency (less time for given tasks). It complements these traditional usability practices and can be incorporated into an integrated strategy for Web usability assurance. With automated tool support for a significant part of the activities involved, our method is cost-effective. We are currently integrating these modeling and analysis tools into a tool suite that supports measurement, analysis, and overall quality improvement for Web applications.

In the future, we should and must carry out validation studies with large-scale Web applications. We also plan to explore additional approaches to discover Web usage patterns and related usability problems generalizable to other interesting domains. We will also further expand our usability research to cover more usability aspects to improve Web user's overall satisfaction.

References

[1] Ruili Geng & Jeff Tian members of IEEE have proposed a transaction paper on "Improving Web Navigation Usability by Comparing Actual & Anticipated Usage".
[2] Liu and his team wrote a book "Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data".
[3] R. Cooley, B. Mobasher, and J. Srivastava, proposed a paper on knowledge information system, "Data preparation for mining World Wide Web browsing patterns".
[4] OM Kumar C. U. and P. Bhargavi published an article on "Analysis of web server log by web usage mining for extracting users' patterns".
[5] C. P. Sumathy, R. Padmaja Valli, T. Santhanam published an article on "An overview of pre-processing of web log files for web usage mining".
[6] T. Arce, P. E. Roman, J. D. Velasquez, and V. Parada published a paper "Identifying web sessions with simulated annealing".
[7] Nirali Honest and Dr. Atul Patel, Dr. Bankim Patel proposed an IEEE conference paper on "A study of path completion techniques in web usage mining".
[8] Mr. Akshay Upadhyay, Mr. Balram Purswani published a paper for International Journal of Scientific and Research Publications on "Web Usage Mining has Pattern Discovery".
[9] Melody Y. Ivory and Marti A. Hearst published an article on "The State of the Art in Automating Usability Evaluation of User Interfaces".
[10] M. Heinath, J. Dzaack, and A. Wiesner published a paper on "Simplifying the development and the analysis of cognitive models ".
[11] Tonio Carta, Fabio Paterno, and Vagner Figueredo de Santanal published article on "Web Usability Probe: A Tool for Supporting Remote Usability Evaluation of Web Sites" on springer.
[12] T. Tullis and B. Albert wrote a book "Measuring the User Experience: Collecting, Analyzing, and Presenting Usability Metrics (Interactive Technologies)".
[13] D. M. Hilbert and D. F. Redmiles, "Extracting usability information from user interface events," ACM Comput. Surveys, vol. 32, no. 4, pp. 384–421, 2000.
[14] M. C. Burton and J. B. Walther, "The value of Web log data in use-based design and testing," J. Comput.-Mediated Commun., vol. 6, no. 3, p. 0, 2001.
[15] A. McDonald and R. Welland, "Web engineering in practice," in Proc. 10th Int. World Wide Web Conf., May 2001, pp. 21–30.