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Enhancing Exploratory Search with Hedonic Browsing Using Social Tagging Tools

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***Abstract*—Exploratory search offers users the privilege to take command of the search process by browsing, selecting, and navigating through the Web to locate targeted information resources. We introduce hedonic browsing as an enhancement for exploratory search. In this article, we propose and empirically validate a hedonic browsing model using social tagging tools. We introduce two hedonic components, namely Curiosity and Enjoyment, and measure their effect on the social tagging exploratory behavior. Our findings suggest that hedonic tag browsing exists and Curiosity with Enjoyment have a strong impact on exploratory browsing and search of social tags.**

Keywords- information retrieval; curiosity; enjoyment; social tags

I. INTRODUCTION

In recent years, there has been a shift in search system design toward larger search tasks rather than the more traditional approach of matching users' queries. The aim that feeds this new trend is to support exploratory search by taking advantage of how the Web is structured. Modern search and navigation technologies are seeking searchers' satisfaction by offering more interactive exploratory features to navigate the Web through trial and error strategies to find information resources. This shift in the system paradigm increases users' expectations when interacting with the Web environment. The users' role is changing from mere receivers of information to explorers seeking to learn and discover new and unanticipated relevant information [1].

Social tagging tools are considered by many as a natural and powerful extension of current social navigation tools and practices. Tags have the potential to improve exploratory search and discovery of information resources [2]. Users can navigate through tag clouds to explore what is trendy and can engage in exploratory trips to discover new tagged information resources. Further, the collective behavior that characterizes these tools makes them enablers of both intentional and unintentional navigational advice [6]. There has been considerable interest in studying social tagging tools. Some work has been done to study users' tagging behavior and the ways social tagging can help users to organize their information objects [3, 4]. However, little is known about how such tools might help people explore and find information resources.

In this paper, we investigate the concept of exploratory search and browsing through social tagging applications. Our goal is to present and verify a model that can help enhance the exploratory search process by empowering users with the tools to browse and search while enjoying the process. The paper is organized in eight different sections. Section 2 deals with related research on exploratory search and social tagging. In section 3, we introduce the research model along with our hypotheses. Section 4 covers the study and the method used. Section 5 handles the results and analysis of the study. We discuss the results and the implications of the study in section 6 followed by the limitations and future research in sections 7 and eight respectively.

II. RELATED WORK

A. Exploratory Search

Exploratory search is a complex set of search activities within the Information Retrieval (IR) system taken by a searcher to broadly explore a topic of interest. Searchers use this approach when they do not have a clear search goal, when experiencing complex search needs, or when they are not satisfied with the output of the search system [11]. Exploratory search consists of two components: (1) a search technology to facilitate the search process; and (2) information objects (e.g., favorite images, email messages, or a list of preferred music files) which must be useful and significant to users to engage them in the search process. Exploratory search sometimes originates from a lack of understanding of certain terminologies, or from a lack of clarity about the structure of an information space [2]. Like any other search, exploratory searches often start with a complicated information need that comes from the environmental context, users' cognitive structure, or by the interaction of both [5].

B. Social Tagging

Social tagging is a feature of various online social media applictions that enable people to label, annotate, or tag information resources with free-form text called tags. The collections of users' tags are known as folksonomy. The main purpose of tagging tools is to organize web resources such as websites (e.g., Delicious and StumbleUpon, photos (e.g., Flickr), music and video files (e.g., Lastfm and YouTube), books (e.g., Amazon.com or LibraryThing), and academic articles (e.g., CiteULike). One of the main features of social

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tagging tools is that they allow users to socially navigate through tags by simply clicking on hyperlinked tags. When users click on a tag, a list of results of all resources or all tags that share the tag appear. This feature enables users to browse through the entire tag collection to see other information sources of interest. The ability of reorienting the view through clicking on tags is known as "pivot browsing", enabling a lightweight method of browsing through the aggregated tag collection[6]. Many tagging-enabled sites offer tag clouds, which display the most popular tags clicked on and used by tag users. In most tag clouds, the most popular tags are shown with bigger font size while the less popular tags are shown with smaller font size[7]. Such features enable users to explore and find new and related information resources. Suchanek et al. [8] indicated that tags help users browse, categorize, and find items. Further, tags are used as a form of information discovery, sharing, and social ranking. According to the authors, tags could be useful for particular tasks such as search, navigation, or even information extraction. Lee [9] indicated that collaborative tagging tools offer a more guided sharing and discovery of information. In line with the discovery of new topics, Mathes[10] indicated that tagged vocabularies help users find unexpected venues that they never thought about before.

III. A Proposed Hedonic Model For Enhancing Exploratory Search

Figure 1 shows a conceptual model to increase the use of users' exploratory search. This model proposes the possibility of *Hedonic* search and browse, where the users enjoy their exploratory search. The term hedonic derives from the word hedonism, used to denote the doctrine that pleasure or happiness is the chief good in life [11]. In the context of this article *Hedonic* means browsing for fun or pleasure, incorporating the constructs of Curiosity and Perceived Enjoyment. We hypothesize that Curiosity and Perceived Enjoyment can lead users to perform more exploratory behavior using social tagging tools.

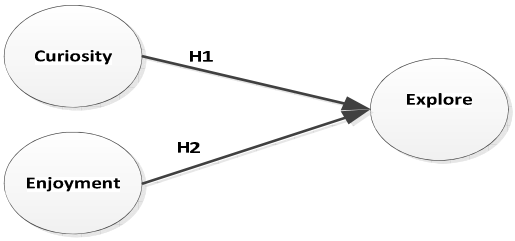


Figure 1. Proposed model to enhance exploratory search

A. Curiosity

Based on Kim and Moon[12], we define Curiosity as the strength of one's belief that interactions with social tagging tools and tags will fulfill the users' intrinsic motives of curiosity. Previous studies showed that Curiosity seems to enhance and increase the quality of search substantially with regard to the attention devoted to information resources and time spend which resulted in a more focused memory and comprehension of new information objects [13]. Malone [14, 15] suggested that when presented with incomplete, inconsistent, or unparsimonious information it can evoke cognitive curiosity. Curiosity was one of the components used by Moon and Kim [12] to describe the influence of perceived playfulness on users` attitude to use the WWW. For example, features such as social bookmarking, hyper-links, and multimedia effects embedded in Web applications can encourage curiosity which results in more browsing and exploration sessions of internet resources.

B. Perceived Enjoyment

Perceived Enjoyment (PE) is defined as the degree to which the activities of using computer systems are perceived to be enjoyable regardless of the anticipated performance of the system [16]. Ali-Hassan and Nevo[17] indicated that social computing tools, including social tagging and bookmarking, although perceived as distracting tools by some organizations, are characterized by a hedonic dimension that has the potential to enhance employees' satisfaction and improve job performance. Overall, it has been confirmed that PE is a major player in user technology acceptance and has great implication for hedonic systems [18, 19]. Accordingly, we present our hypotheses:

H1: Perceived Enjoyment has a positive impact on the Exploration of social tags

H2: Curiosity has a positive impact on the Exploration of social tags

IV. Study

A. Method

In order to verify our conceptual model, we decided to test the influence of two hedonic factors, Curiosity and Perceived Enjoyment, on exploratory browsing and search in social tags. We selected social tagging tools as our main testing applications for hedonic browsing, especially with features such as tag clouds that have the potential to attract users to click on and explore links for pleasure. The study uses an online survey to ask users about their perception and experience of curiosity and enjoyment when interacting with the social tagging tools.

Our instrument comprised 12 questions, eight of which are related to the hedonic factors and four to demographics. The eight questions asked about users' perception and experience when interacting with social tagging systems with a focus on three concepts: Curiosity, Enjoyment, and Explorability. We posted the link to our online questionnaire in relevant discussion boards and Weblogs. Since the goal of the study was only an exploration of the hedonic aspect, we controlled the study within the context of pilot testing. We had the survey online for 3 days. A total of 50 people responded to the survey; of these, 38 answered all the questions of the survey and 12 people were dropped out at the welcome page. With regard to the respondents' profile, 25% of the respondents were females and 54% were male. The age categories of the respondents ranged between 21-65 with the majority of respondents belonging to the 26-30 (22%) and 31-35(18%) ranges. With regard to academic disciplines, 31% of respondents come from the humanities and social sciences, 25%

from management, and 22% from science. Eight social tagging applications were reported as used by the respondents: 33% of the respondents used LibraryThing, 21% used Flickr, 13% used Twitter, 12% used Delicious, and 6-8% used WorldCat, YahooBuzz,Digg, and CiteUlike. With regard to the constructs of the study, we based the Curiosity and Exploration constructs on Moon & Kim[20], and Perceived Enjoyment was based on Davis et al.[16].

V. RESULTS AND ANALYSIS

A. Hyphosis Testing

We hypothesized that both Curiosity and Perceived Enjoyment have a positive impact on the exploratory behavior of social tag users. The following evidence collectively suggests acceptable measurement properties of all of the variables involved in the Study, including Curiosity, Perceived Enjoyment, and Explorability. Table 1shows the descriptive statistics, composite reliability, and Cronbach's alpha. The fact that the values of Cronbach's alpha and composite reliabilities are all higher than the recommended 0.70[21] indicates high internal consistency and convergent validity of our measurements. Overall, given the exploratory nature of the study, validity and reliability of the scales were deemed adequate.

TABLE I. ALPHA & COMPOSIT RELIABILITY

	Alpha	Composite Reliability	N of items
Exploability	0.83	0.897129	3
Curiosity	0.72	0.841618	2
Perceived Enjoyment	0.84	0.890866	4

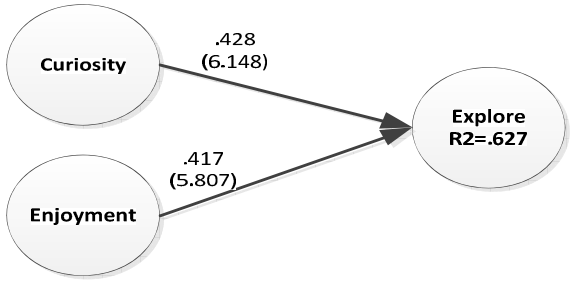
The correlation between the constructs is presented in table 2. There is a significant correlation between explorability and both Perceived Enjoyment and Curiosity. Both Curiosity and Enjoyment scored almost the same at .75, and.74. There is also a strong correlation between Curiosity and Enjoyment, at .76. All the correlations are significant at the .01 level of 2-tailed test.

TABLE II. PEARSON CORRELATIONS FOR, CURIOSITY, EXPLORABILITY, AND PERCEIVED ENJOYMENT

		Explore	Curiosity	Enjoy
Explore	Pearson Correlation	1.00		
	Sig. (2-tailed)	.000		
Curiosity	Pearson Correlation	0.75(**)	1.00	
	Sig. (2-tailed)	.000		
Enjoy	Pearson Correlation	0.74(**)	0.76(**)	1
	Sig. (2-tailed)	.000	.000	

** *Correlation is significant at the .01 level (2-tailed).*

Since the goal of the study is to explore the relationship between the exploration behaviour of tag users and curiosity and enjoyment, we used Structural Equation Modeling (SEM). SEM is an approach used for identifying and estimating models of linear relationships among measured and latent variables [22]. We also used the bootstrapping approach to assess the *t*-value significance based on recommendation by Hair et al.[23]. Our critical t-value is 3.57 for $p \leq 0.01$).



Path coefficient .428 and .417
T-value 6.148 amd 5.807

Figure 2. Proposed model to enhance exploratory search

Figure 2 illustrates the structural model with R^2 value for the independent variable Explore. As recommended by Hair et al [23] an R^2 of .5 and .75 is considered substantial and moderate respectively. In our case, Explore scored an R^2 of .627 which is close to the substantial significance level. This clearly indicates that Curiosity and Perceived Enjoyment have a significant impact on explorability in tagging tools. In other words, Curiosity and Perceived Enjoyment can easily predict Explorability. With regard to the path coefficient, Curiosity scored .428 which is highly significant at the .001 significance level. Perceived Enjoyment also scored high with a path coefficient of .417. The *t*-value for both independent variables is also high. Our critical *t*-value for our sample is 3.57 at the .001 level. Comparing this value with what was produced by Curiosity and Perceived Enjoyment with *t*-value scores of 6.148 and 5.807, we can say safely that the two hedonic variables have a strong impact on the dependent variable Explorability. Accordingly, the two hypotheses of the study were strongly supported.

VI. DISCUSSION

Although our study is a work in progress, the preliminary results of the components of the hedonic factor show promising potential. We developed and validated a two-dimensional hedonic factor combining Curiosity and Perceived Enjoyment for Information Systems IS use in social tagging applications and possibly in social media in general. We propose that the traditional concept of Perceived Enjoyment is not sufficient in measuring the richness and interactivity of social media applications. Perceived enjoyment, when it was originated as a measure of intrinsic motivation through the Technology Acceptance Model (TAM), reflected users' experience with static technology and applications. However, it is difficult to describe existing Web technologies as passive systems, considering their interactive features. Users of these technologies experience other shades and colors of enjoyment such as Curiosity. Although ours is a pilot study, we have shown that users of social tagging tools can attain feelings of enjoyment and pleasure not only from using such tools, but also from the satisfaction they experience from finding new and unexpected information as a result of their exploratory behavior.

VII. IMPLICATIONS OF THE FINDINGS

From a business perspective, hedonic search and browsing can help improve the process of information retrieval within

organizations. Hedonic components can be embedded in browsing tools to help increase employees' work knowledge base; for example, employees' search productivity can be enhanced if their search behavior is guided systematically to serve the company's strategic objectives. Suggested tools could be custom made browsers for different business domains that would encourage employees to explore more work related information that eventually would increase employees' work knowledge base and the overall productivity of their searches.

VIII. Study Limitation and Future Direction

As with almost all exploratory studies, there are some limitations that will be addressed in future studies. As indicated, this was a pilot study with a small population of 38 participants. We acknowledge that this small number of participants does not represent the social tagging population as a whole. The social tagging systems reported by respondents do not reflect all social tagging systems. However, the preliminary results support the inclusion of the hedonic component as a main factor in influencing users' acceptance of technology. We are planning to use these preliminary results to further enhance our model. Our next step is to test the 2-dimensional (2-D) hedonic factor on the attitude on, and the intention to use, social tagging tools. We also need to associate the 2-D hedonic dimension with other factors such as ease of use, usefulness and measure its influence on the actual use of social tagging tools. Further, a comparison between the components of the 2-D (and possibly 3-D) hedonic factor and the influence on the use of other social media tools such as blogging and video systems is worth exploring.

IX. Conclusion

This study proposed a model to encourage and increase exploratory and browsing behaviors through the hedonism experienced by users and navigators of tags.First, weinvestigated how users perceived social tagging interaction. Our results showed users` positive feedback for the three constructs of the model: Curiosity, Perceived Enjoyment, and Explorability. Second, we empirically tested for the influence of Curiosity and perceived enjoyment on users' exploratory search behavior. We found a strong positive association between the social tagging exploratory behavior when users experience enjoyment and curiosity. In other words, our two dimensional components of hedonism can predict the explorability behavior of users of tagging systems. The findings suggest that managers and designers of social tagging systems should adopt a richer and positive perspective into tagging tools. Further, organizations can utilize the hedonic aspect to their benefit to motivate employees to find work related tasks easier and faster using the collaborative tagging intelligence features.

References

[1] G. Marchionini, Exploratory search: From finding to understanding. *Communications of the ACM*, 2006. 49(4).

[2] G.M. Ryen W. White, and Gary Marchionini, Report on ACM SIGIR 2006 workshop on evaluating exploratory search systems. *SIGIR Forum*, 2006. 40(2): p. 52-60.

[3] U. Farooq, et al., *Evaluating tagging behavior in social bookmarking systems: metrics and design heuristics*, in *Proceedings of the 2007 international ACM conference on Supporting group work*. 2007, ACM: Sanibel Island, Florida, USA.

[4] S. Farrell and T. Lau. Fringe Contacts: People-tagging for the enterprise. in *Position paper in WWW Tagging Workshop.* 2006.

[5] T.D. Wilson, Models in Information Behaviour Research. *journal of Documentation.*, 1999. 55(3).

[6] D. Millen and J. Feinberg. Using Social Tagging to Improve Social Navigation *„AH'06, Dublin, Ireland.*

[7] D.S. Mesnage and M.J. Carman, *Tag navigation*, in *Proceedings of the 2nd international workshop on Social software engineering and applications*. 2009, ACM: Amsterdam, The Netherlands.

[8] F.M. Suchanek, M. Vojnovic, and D. Gunawardena, *Social tags: meaning and suggestions*, in *Proceeding of the 17th ACM conference on Information and knowledge management*. 2008, ACM: Napa Valley, California, USA.

[9] K.J. Lee, *What goes around comes around: an analysis of del.icio.us as social space*, in *Proceedings of the 2006 20th anniversary conference on Computer supported cooperative work*. 2006, ACM: Banff, Alberta, Canada.

[10] A. Mathes. *Folksonomies – Cooperative Classification and Communication through Shared Metadata*. 2004 [cited 2009 October 23];

[11] Merriam-Webster, in *Merriam-Webster's Collegiate Dictionary*. 2003, Merriam-Webster Inc: Springfield, MA.

[12] J.W. Moon and Y.G. Kim, Extending the TAM for a world-wide-web context. *Information & Management*, 2001. 38: p. 217-230. .

[13] S. Menon and D. Soman, Managing the Power of Curiosity for Effective Web Advertising Strategies *Journal of Advertising*, 2002. 31 Advertising and the New Media(3): p. 1-14.

[14] T.W. Malone, Toward a theory of intrinsically motivating instruction. *Cognitive Science*, 1981. 4: p. 333-369.

[15] T.W. Malone, What makes computer games fun? *Byte*, 1981b: p. 258-276.

[16] F. Davis, R. Bagozzi, and P. Warshaw, Extrinsic and Intrinsic Motivation to Use Computers in the Workplace*„Journal of Applied Social Psychology*, 1992. 22(14): p. 1111-1132.

[17] H. Ali-Hassan and D. Nevo, *Identifying Social Computing Dimensions: A Multidimensional Scaling Study*, in *Thirtieth International Conference on Information Systems, Phoenix 2009*.

[18] H. Sun and P. Zhang, Causal Relationships between Perceived Enjoyment and Perceived Ease of Use: An Alternative Approach. *Journal of the Association for Information Systems*, 2006. 7(9)

[19] H. Van-der-Heijden, User Acceptance of Hedonic Information Systems. *MIS Quarterly*, 2004. 28(4): p. 695-704.

[20] J.-W. Moon and Y.-G. Kim, Extending the TAM for a World-Wide-Web context. *Information & Management*, 2001. 38(4): p. 217-230.

[21] D. Adams, R. Nelson, and P. Todd, Perceived Usefulness, Ease of Use, and Usage of Information Technology: A Replication. *MIS Quarterly*, 1992. 16(2): p. 227-247.

[22] J.F. Hair, C.M. Ringle, and M. Sarstedt, PLS-SEM. Indeed a Silver Bullet. *Journal of Marketing Theory & Practice*, 2011. 19(2): p. S. 139-151.

[23] M. Bates, The Design Of Browsing And Berrypicking Techniques For The Online Search Interfac. 1989, Online Review. p. 407-424.