MindMargin: Capturing Reader Engagement with an Article-Adjacent Commenting Platform

1st Author Name
Affiliation
Address
e-mail address
Optional phone number

2nd Author Name
Affiliation
Address
e-mail address
Optional phone number

3rd Author Name
Affiliation
Address
e-mail address
Optional phone number

ABSTRACT

Author Keywords
Guides; instructions; author's kit; conference publications; keywords should be separated by a semi-colon. Mandatory section to be included in your final version.

ACM Classification Keywords
H.5.m. Information Interfaces and Presentation (e.g. HCI): Miscellaneous

See: `http://www.acm.org/about/class/1998/` for more information and the full list of ACM classifiers and descriptors. Mandatory section to be included in your final version. On the submission page only the classifiers' letter-number combination will need to be entered.

INTRODUCTION

Motivation
Many websites support the ability to give content-related feedback in the form of comments. Such websites include news pages, media sites, online shops, blogs and social networks. Both reading and adding comments can engage the user in information exchange, personal reflection and lively discussion. In addition, such engagement can impact real world actions like voting, purchasing a product, making choices or participating in a cause.

Traditional commenting systems are featured at the bottom of the content. This vertical structure impedes the reader's ability to view comments alongside the reference media. These systems also lack a method of referencing sections of the original media. Furthermore, the popular filter mechanism of upvoting popular comments to enhance their visibility risks suppressing newer, and inevitably less popular, comments.

Previous research on annotation and commenting systems has focused primarily on one of three goals: enhancing reader comprehension [6] [8] [4], increasing critical analysis and reflection [7], and encouraging a diversity of viewpoints [2] [5].

Separately, the ends of these goals comprise critical components of reader engagement. The value of this engagement can be seen from how these goals benefit the reader. Enhanced comprehension provides a clearer and more direct stream of knowledge to the reader and adds value to the content of the article. Critical analysis and reflection encourage readers to construct and develop their own opinions from the reading. With access to a broader spectrum of perspectives, readers are urged to consider alternate opinions and as a result, to adapt, strengthen, or clarify their own.

In our study, we measure and take into consideration overall engagement. When engagement as a whole is optimized, readers will have a clearer understanding of the article, develop their own viewpoints as they step back from the article, challenge these viewpoints as they come across other opinions, and feel motivated to take action outside of the scope of the article. Ultimately, greater engagement encourages readers to step away from the article, taking what they have learned with a clearer perspective and engaging more knowledgeably and more openly with the outside world.

Approach
We explore how different commenting models encourage and facilitate engagement by proposing a new system. As opposed to traditional systems, our system **MindMargin** displays comments in a horizontal infinite scroll alongside the reference media. We compare the two systems by quantifying the quality of readers' comments and their follow-up actions. We take into account the ratio of substantial responses to overall responses, instances of referencing the text correctly/incorrectly, and follow-up actions.

We have several hypotheses regarding the comparison of these two interfaces:

1. Readers will generate more substantial comments using MindMargin
2. MindMargin reduces instances of misquoting and confusion by referring directly to the reference media
3. MindMargin increases user engagement with the reference media and motivates follow-up action

Hypothesis 1 is motivated by [7] that found that students engaged more critically with the text when the text was accompanied by annotations. Hypothesis 2 is motivated by [8], in which the comprehension of students reading a text increased with the geographic placement of annotations next to the text.

This horizontal structure prevented comments that were out of context and drew students' attention to relevant comments. The authors also found that this increased comprehension encouraged student response and participation. Hypothesis 3 combines the findings of the two previous hypotheses and considers how the increase and optimization of overall engagement induces action and thought beyond the original intended scope of the article.

Contributions

This project includes the following novel contributions:

- a horizontally structured user interface for anchored comments on websites
- a metric to ensure newer comments are still visible beside popular comments while non-constructive comments are less visible
- insights how comments can enhance user engagement regarding
    1. online discussions
    2. resulting actions (ideally in offline scenarios)

RELATED WORK

Previous research has analyzed how different user interfaces facilitate the gathering of information and the digestion of articles. We compare related work in the field that has motivated our study and approach to the design of our system.

Horizontal Structure and Locality

Having comments appear alongside a text has aided students reading comprehension and encouraged more critical analysis of readings in the classroom. *NB* is a tool that supports collaborative annotation on PDFs [8]. It allows both students and teachers to make comments alongside the text in the appropriate context. This results in less error in the students comprehension and draws the students attention to relevant comments. It also aims to facilitate clearer information exchange in the context of the article. NB improves the clarity and comprehension of lengthier articles in particular.

While the comments on NB appear next to the article, another platform uses anchored comments that highlight the referenced section of the text [7]. This system was also studied with student users who were reported to reflect more critically on the the text with the tool and to be better prepared in argumentation activities. Students also had both qualitatively richer and quantitatively more discussions.

Apart from research on academic instruction, the *Brussell* system uses anchored information in news articles [6]. While not a commenting system, Brussell gathers information across various news sites as a means to provide accurate references and background information to parts of the the article unclear to the reader. By highlighting and interacting with passages in the original article, the reader can request additional background information from different sources. Brussell also suggests questions, such as "Who is this person?", for the reader to pose that probe deeper into the understanding of the article.

The geographic location of comments has nontrivial impact on the readers quality of understanding and consequent engagement of the article. As opposed to traditional vertical structures, a horizontal design provides comments that reference the text either directly or in the appropriate context. The optimization of screen real estate through a horizontally planted commenting system motivates our design for MindMargin.

Skewed and Confused: What is Right?

Determining what is important and what is extraneous in a comment is a challenge that all commenting systems must face. Whereas comment placement, as explored previously, affects the overall quality of comments, we must also consider how to increase the visibility of a diverse set of relevant comments.

Opinion Space presents a novel interface as a solution for diversifying comments in a system [2]. Instead of the traditional list format, OpinionSpace employs a visualization technique that reveals the diversity of aggregate comments. Thus, comments are ordered in any particular way and not shown to the reader with the oldest first, the most popular first, or in another skewed manner as is inevitable with a list. MindMargins horizontal structure naturally optimizes screen real estate and prevents clustering of comments by allowing them to spread along the length of the text.

Because opinions in political news articles are frequently biased, another tool, called *Balancer*, accompanies the reader on news articles and provides information on how politically skewed his/her aggregate source of news is [5]. This widget seeks to engage readers in a diverse set of perspectives.

Both OpinionSpace and Balancer reveal that there exists value, as well as a need, in encouraging the consideration and discussion of divergent views online. However, the latter study also points out that people often gravitate to other people and articles with similar views or views that agree with their own. Thus, comments that disagree with the article are likely to be downvoted by the community and become invisible, further discouraging individuals with different views to read the article. In MindMargin, we aim to address this problem by developing a more objective voting system that upvotes a comment based on a diverse set of criteria, rather than a single thumbs-up vote of popularity.

Another study examines the confusion that some even enriching comments present. *Reflect* is a platform that enables users to summarize each others comments in order to enhance comprehension and provide feedback to fellow commenters [4]. This aims to dissipate the confusion and extract the useful information in a comment. With anchored comments alongside the text, MindMargin is designed to minimize confusion by having readers reference the text directly and other readers have context to posted comments.

Invisibility-Disturbance Tradeoff

In optimizing for comment engagement, we must minimize the disturbance that comments cause to the reader as well as maximize their visibility to ensure the readers engagement

with them. Thus, there is a tradeoff between how hidden and how disruptive a comment is to the users reading experience.

With traditional vertical platforms, comments are far from the view of the reader as he/she reads the article. They minimize disturbance but also, considering a readers primary task is to read the article, decrease the chance that he/she will read the comments. These platforms also split the engagement of reading an article from the engagement of reading the comments. This gap encourages some readers to skip some or all of the article and to depend on the comments alone for their source of knowledge from the article. In MindMargin, we seek to bridge this division with the horizontal commenting system. Readers are then encouraged to view comments as a companion to the article as opposed to an occupant of a separate niche.

While comments must be visible to draw and enhance reader engagement, highly visible comments can cause disturbance and instead decrease engagement. When applied to designing user interfaces, active pop-up comments have been found to be highly useful to designers, but also somewhat disruptive to their concentration [1]. An interface that has too many moving elements can disturb the reader's focus more than engage him/her in the material.

Encouraging readers to comment also hinges on the visibility of the commenting system as well as its disturbance to the reader. The readers main goal and primary task are generally to read the article passively. The active decision of commenting on the article must be viewed as secondary. One study showed that readers are more likely to engage in a secondary task if the threshold of that secondary engagement is low [3]. However, the methods that lower barriers to the task most effectively, like pop-ups, are also highly disruptive. In the design of MindMargin, the horizontal structure inherently adds to the visibility and disturbance of the system when compared against a vertical platform. Thus, to optimize for engagement, we must focus on actively minimizing the systems disruption.

IMPLEMENTATION

We implemented MindMargin as a classical client/server web-application. Users interact with the MindMargin client as a front-end system using a web browser. The client communicates with the server back-end using AJAX to a) request existing data or b) persist new data. The server reads and stores data in a relational database.

Front-end

The client interface consists of a clean user interface to avoid design cluttering and distraction. Figure 1 shows the MindMargin system in action. The application is split into two sides: The reference media on the left and and an adjacent commenting system on the right. The commenting system displays comments in a horizontal infinite scroll. Thus, an unrestricted amount of comments can be linked to the reference media. Navigation within the infinite scroll component can be performed via mousewheel interaction (either left/right or top/down scrolling with the same effect) or by adjustment of a slider on the bottom of the right split screen.

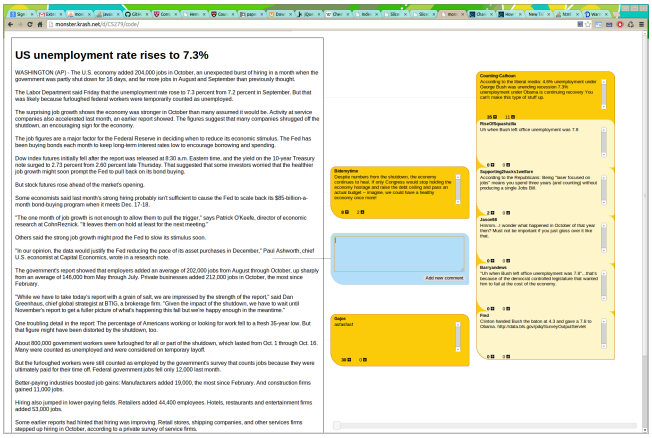

Figure 1. The MindMargin system consists of a web client (shown here) and a server side back-end.

Comments are anchored to the horizontal reference point of the media by thin dotted lines. If a comment has replies, a dropdown button appears on the comment's footer. Lighter in color, replies to comments appear vertically under their comment when the button is clicked. This arrangement optimizes horizontal real estate by reserving horizontal space for parent comments. Finally, while navigating through the infinite scroll, the reference media remains fixed on the left for quick reference against referential comments and replies.

The MindMargin front-end was written in JavaScript using the popular jQuery and jQuery UI libraries. A model-view-controller pattern was chosen to structure the application code base. The user interface itself was created to adjust responsively to any window size.

Back-end

The server component of MindMargin was written in PHP and communicates with the front-end and a relational database. Communication with the front-end is ensured by providing a REST-API which can be called via AJAX. The entity model of the client is replicated on the server. Data is read and stored using a custom and fully generalized object-relational-mapper. We chose MySQL for our database with a table each for users and comments.

Throughout the implementation, we followed an iterative approach to programming our software. The developer team was small. All developed code is released under the BSD open source license on github.

PLAN

- **Milestone 1 (10/31/2013)**
  - Complete relevant literature review research
  - Explore other methods for measuring engagement (in addition to sharing articles)
  - Design experiment and identify method of targeting participants (Question to be answered: how will we get people to participate?)
  - Compile a summary of existing commenting platforms and their features

(http://www.hongkiat.com/blog/3rdparty-comment-discuss-systems-reviewed/)

- **Milestone 2 (11/05/2013)**
  - Prepare working prototype
  - Two different commenting systems – identify which features are constant
    - Vertical (existing)
    - Horizontal (novel)
  - Complete relevant literature review research
  - Explore other methods for measuring engagement (in addition to sharing articles)
  - Design experiment and identify method of targeting participants (Question to be answered: how will we get people to participate?)
  - Compile a summary of existing commenting platforms and their features (http://www.hongkiat.com/blog/3rdparty-comment-discuss-systems-reviewed/)
- **Milestone 3 (11/12/2013**
  - Describe, design and execute experiment
  - Begin data collection
- **Milestone 4 (11/19/2013**
  - Organize preliminary results
  - Analyze data and compare with hypotheses
  - Draw conclusions
- **Milestone 5 (11/26/2013**
  - Revise all sections for final review

REFERENCES

1. Ericsson, M., Baurén, M., Löwgren, J., and Waern, Y. A study of commenting agents as design support. In *CHI 98 Cconference Summary on Human Factors in Computing Systems*, CHI '98, ACM (New York, NY, USA, 1998), 225–226.
2. Faridani, S., Bitton, E., Ryokai, K., and Goldberg, K. Opinion space: a scalable tool for browsing online comments. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, CHI '10, ACM (New York, NY, USA, 2010), 1175–1184.
3. Hoffmann, R., Amershi, S., Patel, K., Wu, F., Fogarty, J., and Weld, D. S. Amplifying community content creation with mixed initiative information extraction. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, CHI '09, ACM (New York, NY, USA, 2009), 1849–1858.
4. Kriplean, T., Toomim, M., Morgan, J., Borning, A., and Ko, A. Is this what you meant?: promoting listening on the web with reflect. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, CHI '12, ACM (New York, NY, USA, 2012), 1559–1568.
5. Munson, S. A., Lee, S. Y., and Resnick, P. Encouraging reading of diverse political viewpoints with a browser widget. In *ICWSM* (2013).
6. Wagner, E. J., Liu, J., Birnbaum, L., and Forbus, K. D. Rich interfaces for reading news on the web. In *Proceedings of the 14th international conference on Intelligent user interfaces*, IUI '09, ACM (New York, NY, USA, 2009), 27–36.
7. Wolfe, J. Annotations and the collaborative digital library: Effects of an aligned annotation interface on student argumentation and reading strategies. *I. J. Computer-Supported Collaborative Learning 3*, 2 (2008), 141–164.
8. Zyto, S., Karger, D., Ackerman, M., and Mahajan, S. Successful classroom deployment of a social document annotation system. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, CHI '12, ACM (New York, NY, USA, 2012), 1883–1892.