EventLens: An Automatic Magazine Generating System for Social Media

Hao Chen, Han Tang, Zhiyu Wang, Peng Cui, Yingqing Xu, and Shiqiang Yang

Tsinghua University
Peter_chenhao@126.com, wonderwall1231@qq.com
zy-wang08@mails.tsinghua.edu.cn, cuip@mail.tsinghua.edu.cn
yingqingxu2004@hotmail.com, yangshq@tsinghua.edu.cn

Abstract. Social media has become the most convenient platform for news reading nowadays. In this paper, we introduce an automated digital magazine generating system—EventLens, which provides a platform to help the users get information more effectively through intelligent information selection and integration on social media. In our application, we not only design the functionalities, interface, and overall user experience to satisfy users' need in terms of information content and reading habits, but also propose the necessary solutions: an automated magazine layout method and a swift image retargeting method to solve the problems in the process of digital magazine auto-generation.

Keywords: magazine generating, layout, image retargeting, usability.

1   Introduction

Social media platforms, such as Twitter, are convenient channels for users to share experiences, discuss events, and read news. The big events are always the most trending topics on the micro-blog platforms. Such a platform provides not only a large quantity of rich media content but also gives users' different point of views of ongoing trending events. Besides, much more facets are also available from the third-party resources such as the news websites, which are good supplement for social media information. Adequate resources enable users to access the information presented comprehensively. However, information overload makes it very time-consuming to effectively find the useful content. Furthermore, the data retrieval of cross-platform usage is absolutely uncomfortable comparing to users' traditional reading habits. One of the possible solutions is to closely integrate the contents from multiple platforms into one medium like a digital magazine, to give a much more unified UI and centralized experience. However, how to provide the mechanism for auto-generate a magazine with aesthetic layout becomes a big challenge. In this paper, we introduce a novel digital magazine generation system—EventLens, that can automatically generate a digital magazine with a user-friendly and aesthetic layout.

2   Related Work

Digital magazines have become more and more popular since 1980s; and it has been much evolved to be highly customizable. Many readers subscribing to digital magazines not only have desires to read their contents, but also tend to personalize their forms, such as selecting the layouts and appearances. With the rapid increasing of the mobile applications, now people can easily download many Apps from different platforms to create heavily customized digital magazines for personal or commercial purposes.

The apps that are currently available on different platforms mostly have slick user interface and enable the customization as their advantages. They classify the information into categories and let users to customize the categorization. For example, Flipboard lets user to have their own information resources registered as content provider, such as Twitter and Facebook, on the "board"—the main view in their UI. It is shown to be a generally accepted concept, from the huge success of Flipboard on iOS [1]. However, these apps are only categorizing the information in very restricted and limited ways, without being able to put the related news together automatically. Users cannot get any sort of linkage based on the semantic relevance of different pieces of information like Wikipedia does. The result is that user has to keep going in and out of different categories or even different apps, to manually search for more information about the same event he is interested in. We have developed EventLens system which is able to find the news related to a certain topic contextually and integrate them together.

In the digital magazine generating procedure, we faced two big challenges. The first is how to automatically generate the layout of the contents to deliver great legibility via well-designed presentation; and the second is how to do image-retargeting to make the reading experience conformable.

For the first challenge, there are some previous work but mainly focus on adaptive document layout via manifold content [2], and adaptive layout for dynamically aggregated documents [3]. These work give us great inspiration, but due to the different usage scenarios, it is hard to directly employ their methods to solve our problems. For the second challenge, many image retargeting methods have been studied [4], such as Non-homogeneous warping (WARP) [5], Seam-Carving (SC) [6], Scale-and-Stretch (SNS) [7], Multi-operator (MULTIOP) [8], Shift-maps (SM) [9], Streaming Video (SV) [10], and Energy-based deformation (LG) [11], but most of them were based on relatively complex computer vision algorithms. However, our foreground part based on Flash Actionscript3.0 that is not so strong in pixel level processing. So a fast image retargeting without complex computing is necessary.

3   System Design

To solve the information integration problem in social media, we propose our automatic event mining algorithm and layout management method. Our system (Fig.1) deals with a huge amount of micro-blog data by using the algorithm called "Bi-lateral

Correspondence Topic Model" [12] which mines the correlated data among the images, texts, and the related web news, to make each event containing more sufficient information. These correlated data consist of the unformatted texts, images, time, locations, persons, and articles. How to re-organize and make up such complex data in the digital magazine is a big challenge. There are three levels in our magazine generation system to form a top-down scope. The first level provides several trendy topics to make it easier to follow the popular events, since news readers are more likely to care about what is popular. On the second level, micro-blog keywords and related images provide users an overview of the whole event. The third level presents the detail of the news articles; the newsreader can access the links of the original news sources.

3.1   User Interface Design

A friendly user interface should match the product's function and the cognitive model from user's mind, as well as fitting the usage of a user. We first design the structure of our magazine. Traditional magazines usually attract people's attention with a shining cover, and then connect the contents together with an easy-read menu. Mostly there are two kinds of readers: some may read the magazine from the beginning to the end; and the others may find the special content that they are interested [13]. Actually, it is very similar to readers of websites, i.e., someone may browse the website from top to the bottom and the other ones may just do glance over on the site. So we design the structure of our magazine according to the habit of readers and the feature of the cognitive model of magazine. Based on our three levels system, we construct a flat and wide structure that can meet the easy-read need of user. A flat and wide structure of a website is that there are fewer levels but more pages in a level. So users can clearly find where they are and get more information at one time.
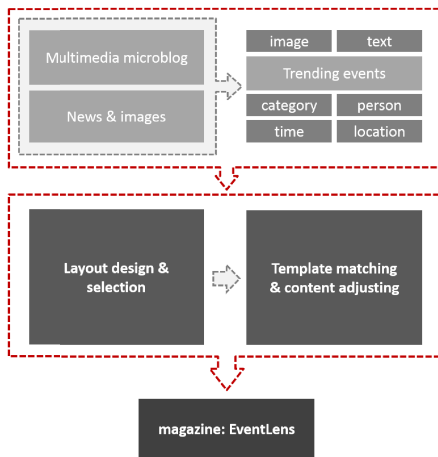

Fig. 1. Processing flow of magazine generation

Furthermore, we should propose a visual style to match our information structure. Based on the characteristics of our magazine—pushing news quickly and intensively, finally we use Metro UI design style for reference. Metro UI design style is a design language that is from Swiss graphic design [15] and focuses on presenting the information and pushes the information to user directly [16]. It provides a way that user can get the information immediately from background. What we need is to design the interface that is mush simple to just read the news. So we design the topic template into a color block just filled up with news' keywords and pictures, and then connect the pages with appropriate visual effect to enrich the magazine.

3.2   Auto-layout Based on Designed Templates

What does it mean to be beautiful? It is a difficult question. Artists always bring us beautiful sense which digital device cannot give us. We have tried some pure automatic layout methods, such as using Golden Ratio to divide the space to several parts, but none of the methods is good enough to satisfy the participants and even ourselves. For the traditional magazine, every page is well-designed by the editors and designers, so if we design some nice page layout template and find out what is the proper situation for each template, it may be helpful for solving the layout problem—since the human editors and designers are best at putting the proper contents into the right places and designing the best looking possible layouts of magazines, and our goal is to mimic what they do in an automated way. In order to have an aesthetic magazine that allows users to efficiently read the information, we carried out a user study that aimed to find out what kind of page layout are more reasonable for users' reading as well as more flexible for fitting texts and images with different scales. We firstly selected some news and images, then put them into the pre-designed template, and to ask the participants to vote which one they like the most. From seeing the results, we were able to find the most satisfied layout templates.
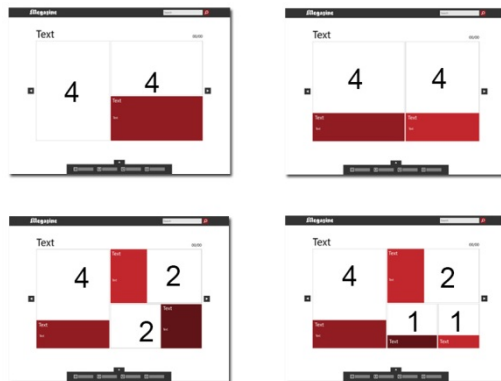

Fig. 2. The participants voted well-designed layout templates

The results show that when the templates contain 1 to 4 news blocks they will generally be accepted by participants. After calculating and analyzing the area division and arrangement of each layout, we found that if we define different values (large=4, medium=2, small=1) of each block, the layout template will fit the news with different size (Fig. 2). After layout templates design, our next step is how to put the real news into them. News on social media has not only texts and images, but also its time, location, type and popularity. The popularity always greatly affects the users' reading order, so we choose popularity as one factor for the news re-ordering. Popularity calculating is supported in our background algorithm, each piece of news is provided with its popularity. Firstly, the system will provide a popularity ranking, because users may pay more attention to more popular information. After popularity ranking, the system quantitates the news images by their resolutions into three levels (large=4, medium=2, small=1), while we think that the news with better image will take larger space and. Our system will separate the news to several pages firstly, each page contains 1 to 4 piece of news. Because the area summation of each layout template is 8, the system will computing how to group the news with different image levels to get a summation nearest to 8. Also, considering that adjacent pages should have slightly different layout to avoid repetition form which may influence the user experience, our system do not allow same layout form of news appearing in adjacent pages. After grouping the news by pages, we need to place each piece of news into the corresponding news block in the page.

3.3   Fast Image Re-targeting

In our system, every page of the magazine contains some news blocks, every news block have the news image as the cover (Fig. 3). However, if the images of the new have a different size from the block, it will be quite necessary to do extra work to fit the news image into the block size. Our images all come from micro-blog platform,
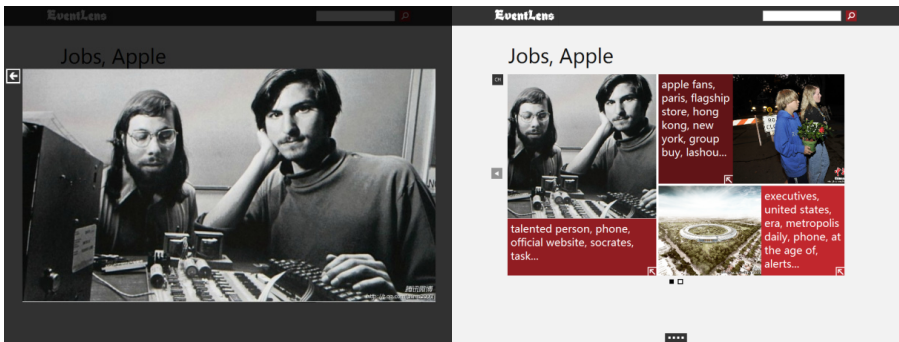

Fig. 3. Image retargeting result in our system

therefore the form factors and resolutions of the images are very different. In some extreme cases, pictures may even have a width-to-height ratio of 1/10 or less. And EventLens system is an automatic online magazine system, for one thing it will be a waste of time for traditional image retargeting methods to treat a large number of strange pictures by some complex pixel computing. For another reason the Flash Player platform is not very strong in image processing in pixel level. Thus, we need a fast and simple image retargeting method that can provide a generally acceptable result; maybe it cannot give the best result in quality, but getting the job done simple and fast is more important.
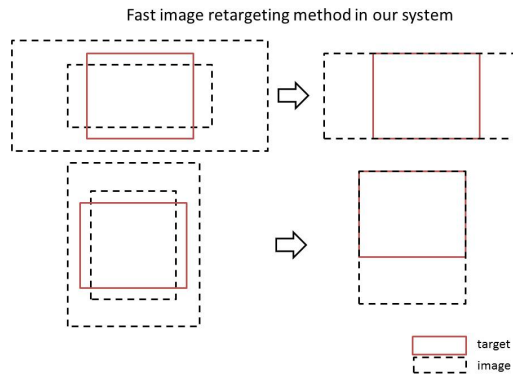
Fast image retargeting method in our system

target
image

Fig. 4. Flow of fast image retargeting in our system

Considering the complexity of the social media images, we randomly selected 2000 images from Tencent Weibo as our sample pool. Then we manually retargeted the images to fit our templates with the best effort. During our work, we found that in the horizontal direction the main part of the image are mostly near the center, and we also found that in the vertical direction the main part of the image are mostly near the top. So we began to think how we can retain the main part of most of the images after a fast and simple treatment.

In order to retarget the images, we firstly compare the width/height ratio of the image with the re-targeting window. If the original image is wider than the retargeting image, we scale the original image without width/height ratio change until the height of the image and the retargeting image are equal, and then center-align the image to the retargeting window. If the original image is higher than the retargeting image, we scale the original image without width/height ratio change until the width of the image and the retargeting image are equal, and then top-align the image to the retargeting window(Fig. 4).

To validate the result of our image retargeting algorithm, we write a program, which aims to test whether the result will satisfy the users (Fig. 5). The program

shows a random image from the dataset which contains about 20,000 images from Tencent Weibo (different dataset from the 2,000 sample images). We asked 20 average users and 5 artists to participate the experiment. The result shows our image retargeting algorithm has over 85% satisfaction (Fig. 6). So that we consider that the algorithm is an efficient method for our system.
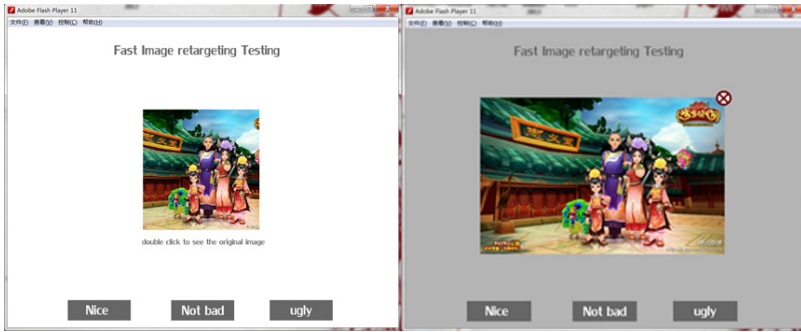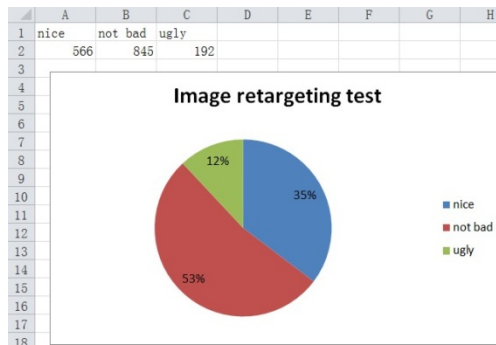

Fig. 5. Image retargeting test program

Fig. 6. Result of image retargeting test

4   Demonstration

To evaluate the effectiveness of our system, we have an online prototype of automatically generating a magazine by dealing with Tencent micro-blog data. Our system not only provides micro-blogs, images, and news of the hot events, but also allows users to search their interested events by keywords (Fig. 7). The keywords and images of a specific event give a more intuitive view (Fig. 8). For more detailed news or corresponding micro-blogs about the event, some hot news are also crawled from search engine and social pulses from micro-blogs. The page layout, the color selection, and the information structure are attentively designed. Our system and design have been recognized by ACM multimedia 2012 Grand Challenge. [17]
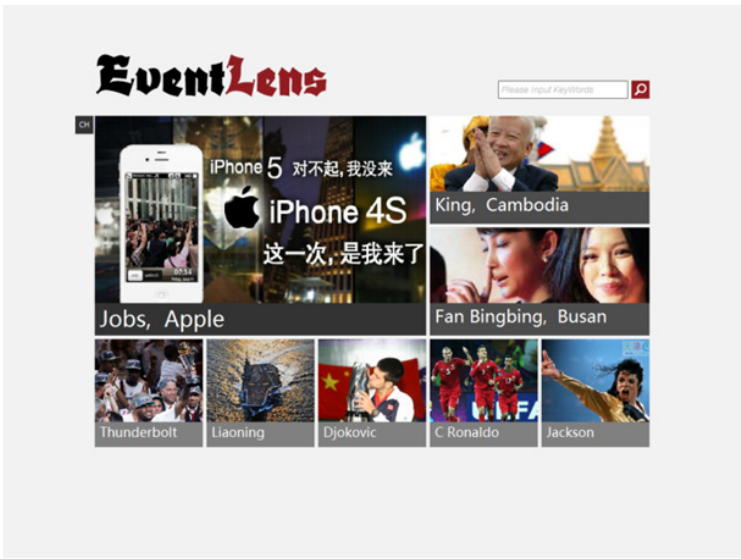
Fig. 7. Hot event detection in social network data by Bi-lateral Correspondence Topic Model
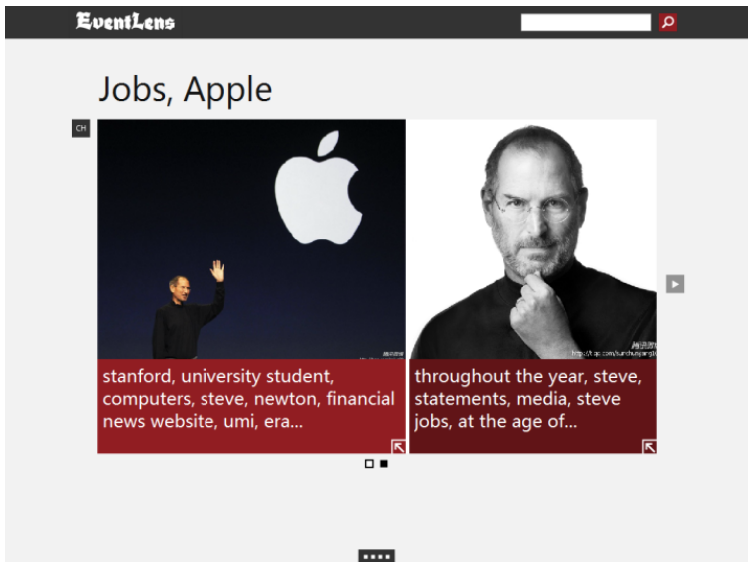

Fig. 8. Automatic layout based on designed template selection

5　　Conclusion

Our EventLens system proposes a good solution of social network multimedia information integration, while it provides a platform that user can get social media

information about some events and topic more efficiently. Firstly, we designed and set up an automatic magazine generating system to make it more comfortable for users in reading information of events and topic on social media, because digital magazine form may satisfy the users traditional reading habits better. For more, the auto-system also reduces the human supervise editing cost. Thirdly, we developed a layout generation and designed templates selection method to make the magazine both automatic and aesthetic. Finally, we found a method to solve the problem of reducing the loss of semantic meaning and visual effectiveness when pictures sizes are not aligned well with the templates.

References

1. Indvik, L.: Flipboard: Behind Mobile's Most Beautiful News Reading Magazine, `http://mashable.com/2012/06/05/flipboard-design/` (June 06, 2012)
2. Jacobs, C., Li, W., Salesin, D.H.: Adaptive document layout via manifold content. In: Second International Workshop on Web Document Analysis, WDA 2003 (2003)
3. Schrier, E., Dontcheva, M., Jacobs, C., Wade, G., Salesin, D.: Adaptive Layout for Dynamically Aggregated Documents. In: Proceedings of the 13th International Conference on Intelligent User Interfaces (2008)
4. Rubinstein, M., Gutierrez, D., Sorkine, O., Shamir, A.: A Comparative Study of Image Retargeting. SIGGRAPH ASIA 2010 (October 2010)
5. Wolf, L., Guttmann, M., Cohen-Or, D.: Non-homogeneous Content-driven Video-retargeting. In: Computer Vision, ICCV 2007 (2007) (WARP)
6. Rubinstein, M., Shamir, A., Avidan, S.: Improved seam carving for video retargeting. Transactions on Graphics (TOG) - Proceedings of ACM SIGGRAPH 2008 (2009) (SC)
7. Wang, Y.-S., Tai, C.-L., Sorkine, O., Lee, T.-Y.: Optimized scale-and-stretch for image resizing. ACM Transactions on Graphics (TOG) - Proceedings of ACM SIGGRAPH Asia 2008 (2008) (SNS)
8. Rubinstein, M., Shamir, A., Avidan, S.: Multi-operator media retargeting. ACM Transactionson Graphics (TOG)-Proceedings of ACM SIGGRAPH 2009 (2009) (MULTIOP)
9. Pritch, Y., Kav-Venaki, E., Peleg, S.: Shift-Map Image Editing. In: Computer Vision, ICCV (2009) (SM)
10. Krähenbühl, P., Lang, M., Hornung, A., Gross, M.: A system for retargeting of streaming video. ACM Transactions on Graphics (TOG) - Proceedings of ACM SIGGRAPH Asia 2009 (2009) (SV)

11. Karni, Z., Freedman, D., Gotsman, C.: Energy-Based Image Deformation. Computer Graphics Forum 28(5), 1257–1268 (2009) (LG)
12. Wang, Z., Cui, P., Xie, L., Chen, H., Zhu, W., Yang, S.: Analyzing Social Media via Event Facets. ACM Multimedia 2012 Grand Challenge (2012)
13. Hermes, J.: Reading Women's Magazines: An Analysis of Everyday Media Use (June 16, 1995)
14. Terror, D.: Lessons From Swiss Style Graphic Design (July 17, 2009), `http://www.smashingmagazine.com/2009/07/17/lessons-from-swiss-style-graphic-design/`
15. Hurlburt, A.: Publication Design: Guide to Page Layout, Typography, Format and Style (July 1976)
16. Mkruzeniski: How Print Design is the Future of Interaction (April 11, 2011), `http://kruzeniski.com/2011/how-print-design-is-the-future-of-interaction/`
17. ACM Multimedia 2012 Grand Challenge (2012), `http://www.acmmm12.org/ntt-docomo-challenge-event-understanding-through-social-media-and-its-text-visual-summarization/`