Title: Tag Clouds

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Tag Clouds

Synonyms

Tagclouds, Keyword Clouds, Term Clouds

Glossary

Resource: Any kind of web content, e.g. documents, hyperlinks, images or videos, that is uniquely addressable.

Tag: A short string, term or word that describes an online resource and that is applied by a person.

Word Cloud: A visualization method that shows the top N most frequent words of a text document.

Definition

A Tag Cloud is a visualization method that summarizes a set of tags related to a certain resource or a set of resources in a visually appealing manner. Contrary to a word cloud, the tags in the tag cloud are generated by people and refer to resources through links. Usually, a tag cloud shows the top most N tags of one particular online resource, a set of resources or the resources of the whole system. A very basic and at the same time very popular approach for tag clouds calculation is an algorithm that sorts the tags by alphabet and indicates the importance of each tag by font size (see Figure 1). However, today a large variety of tag cloud calculation algorithms exist. Some of them display tags in different colors, some of them cluster tags into categories (see for example Figure 3) or according to their semantic meaning, while others manipulate the font, the intensity of the tags or simply display the tags as a list [1; 4].

Fig. 1. An example of a tag cloud – in this case Amazon's global tag cloud – showing the most popular tags of the system sorted by alphabet and boosted in font size according to their importance.

Historical Background

A first well-known use of tag clouds in an online information system was in the photo sharing system Flickr which integrated tag clouds as method to visualize the tags of images on a large-scale in 2004 [6]. Tag clouds were also popularized around the same time by the online bookmarking site Delicious and Technorati [6]. Today, many popular online platforms utilize tag clouds on a global or local basis to either visualize the tags of the whole system or of a particular resource and to support the users in their information seeking process.

Key Applications

In today's online information systems, a key application for tag clouds is content summarization of one particular or multiple resources to serve as a visually appealing tool to support the user in her information seeking process. If used as a tool for navigation, a tag in the tag cloud refers to a list of resources that is usually sorted by date, alphabet or similarity [3]. Prominent examples of online systems utilizing tag clouds as a navigational tool include for instance LastFM, Delicious or Flickr (see Figure 2). An application utilizing tag clouds for search result summarization is the Yahoo! TagExplorer [7], providing the user with the possibility to search Flickr photos with a so-called faceted tag cloud (see Figure 3).

Usefulness of Tags Clouds

Due to their visually appealing appearance, tag clouds gained tremendously in popularity over the past few year, mostly serving as a tool for better information access in information systems. Interestingly, while most of the research on tag clouds was

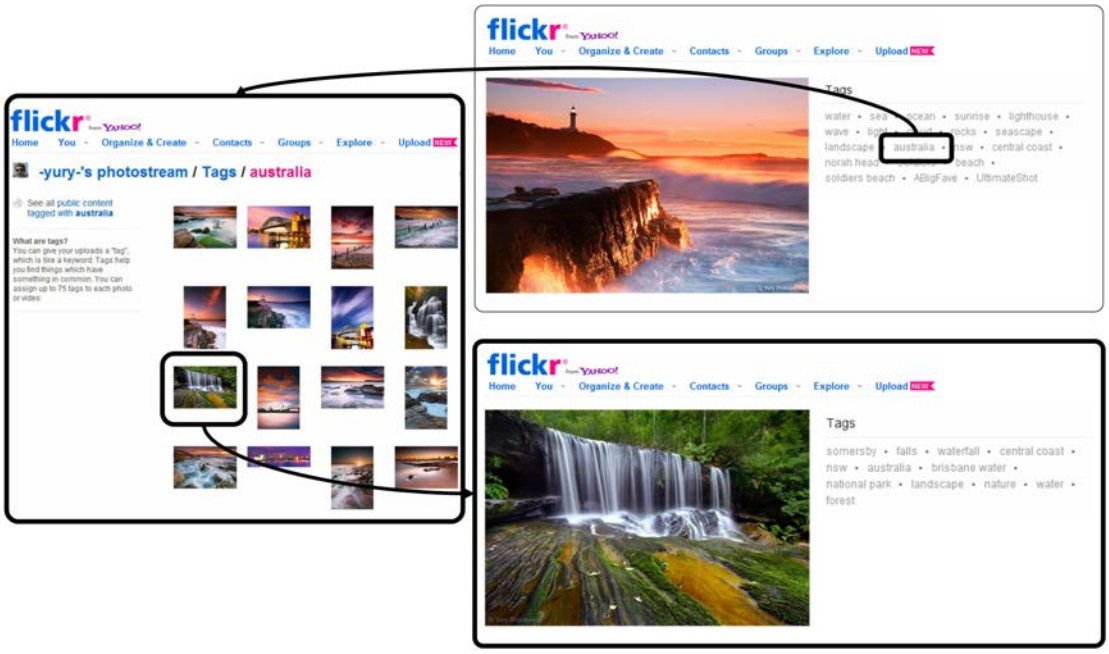

Fig. 2. An example of how tag clouds are used in Flickr as a navigational tool to browse from one resource to another.

devoted to the development of better visualization algorithms, the usefulness of tag clouds for "efficient" information access remained unexplored for a long time [8; 10].

One of the early research papers evaluating the usefulness of tag clouds for information access was a study by Halvey and Keane in 2007. In their work [2], they performed a user study with 62 users to investigate six different and popular tag cloud calculation algorithms compared to an alphabetically sorted list. For evaluation, they used a selection task where users had to find a randomly chosen item. They found that tag clouds providing both – alphabetization and font size – aid users to select items more easily and quickly than other approaches.

Another important work investigating the usefulness of tag clouds for search result summarization was a study by Kuo et al. In their work [5], they analyzed the utility of tag clouds for the summarization of search results from queries over a biomedical literature database. A user-study showed that "the tag cloud interface is advantageous in presenting descriptive information and in reducing user frustration" compared to a

standard layout. However, Kuo et al. also observed that "it is less effective at the task of enabling users to discover relations between concepts".

Another work in this context and the first study investigating tag clouds for the task of navigation is a study by Helic et. al. In their work [3] the authors modeled tag clouds as a directed bipartite network and showed on a network-theoretic level that tag clouds spawn networks which are in general efficiently navigable. However, taking user interface decisions such as "pagination" combined with reverse-chronological listing of resources into account the authors demonstrated that tag clouds are significantly impaired in their potential as a useful tool for navigation.

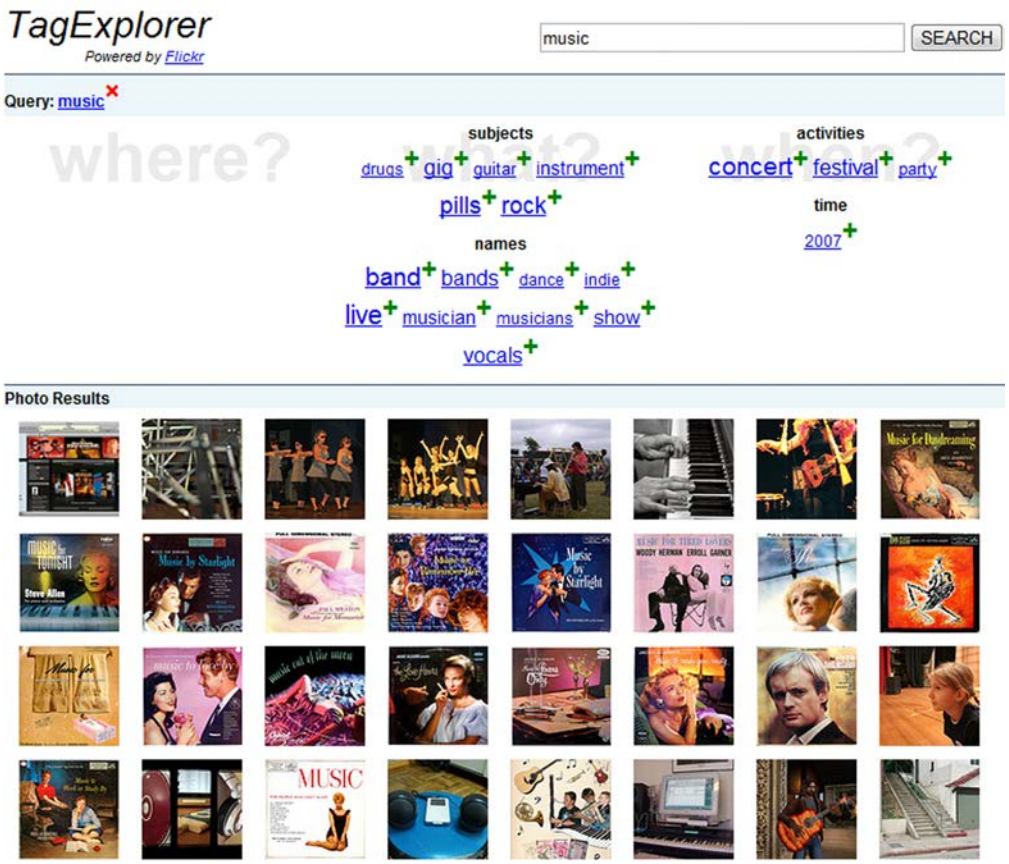

Fig. 3. Yahoo! Tag Explorer as an example of an online system utilizing so-called faceted tag clouds for search result summarization.

Future Directions

Although tag clouds are widely used today and research has shown their usefulness for instance for search result summarizations or selection tasks, research in this area is still inconclusive. Especially studies on cognitive or navigational aspects of tag clouds are in early stages. While recent work [9] shows that it is possible to produce efficiently navigable tag clouds from a network-theoretic perspective, it still remains unclear to what extent tag clouds aid users in cognitive processing and/or navigation of information.

Cross-References

Folksonomies

Analysis and Mining of Tags, (Micro-)Blogs, and Virtual Communities

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References

1. Bateman S, Gutwin C, Nacenta M (2008) Seeing Things in the Clouds: The Effect of Visual Features on Tag Cloud Selections. In: Proceedings of the 19th ACM Conference on Hypertext and Hypermedia, HT'08, ACM, New York, NY, USA, pp 193–202, http://dx.doi.org/10.1145/1379092.1379130
2. Halvey MJ, Keane MT (2007) An Assessment of Tag Presentation Techniques. In: Proceedings of the 16th International Conference on World Wide Web, WWW'07, ACM, New York, NY, USA, pp 1313–1314, http://dx.doi.org/10.1145/1242572.1242826

3. Helic D, Trattner C, Strohmaier M, Andrews K (2011) Are Tag Clouds Useful for Navigation? A Network-Theoretic Analysis. International Journal of Social Computing and Cyber-Physical Systems 1(1):33–55, http://dx.doi.org/10.1504/IJSCCPS.2011.043601
4. Kaser O, Lemire D (2007) Tag-Cloud Drawing: Algorithms for Cloud Visualization. In: Proceedings of Tagging and Metadata for Social Information Organization (WWW 2007), http://arxiv.org/abs/cs/0703109
5. Kuo BYL, Hentrich T, Good BM, Wilkinson MD (2007) Tag Clouds for Summarizing Web Search Results. In: Proceedings of the 16th International Conference on World Wide Web, WWW'07, ACM, New York, NY, USA, pp 1203–1204, http://dx.doi.org/10.1145/1242572.1242766
6. Tagclouds (2012) Tagclouds.com, [Online; accessed 2012-08-08], http://www.tagclouds.com
7. TagExplorer (2012) Sandbox from Yahoo! Research, [Online; accessed 2012-08-08], http://tagexplorer.sandbox.yahoo.com
8. Trattner C, Lin Yl, Parra D, Yue Z, Real W, Brusilovsky P (2012) Evaluating Tag-Based Information Access in Image Collections. In: Proceedings of the 23rd ACM conference on Hypertext and Social Media, HT'12, ACM, New York, NY, USA, pp 113–122, http://dx.doi.org/10.1145/2309996.2310016
9. Trattner C (2012) On the Navigability of Social Tagging Systems. Dissertation, Graz University of Technology, Graz, Austria, pp 1–240, https://online.tugraz.at/tug_online/wbAbs.showThesis?pThesisNr=46709
10. Venetis P, Koutrika G, Garcia-Molina H (2011) On the Selection of Tags for Tag Clouds. In: Proceedings of the 4th ACM International Conference on Web Search and Data Mining, WSDM'11, ACM, New York, NY, USA, pp 835–844, http://dx.doi.org/10.1145/1935826.1935855

Recommended Reading

1. Hearst MA, Rosner D (2008) Tag clouds: Data Analysis Tool or Social Signaler? In: Proceedings of the 41st Annual Hawaii International Conference on System Sciences, HICSS'08, IEEE Computer Society, Washington, DC, USA, pp 160, http://dx.doi.org/10.1109/HICSS.2008.422
2. Helic D, Körner C, Granitzer M, Strohmaier M, Trattner C (2012) Navigational Efficiency of Broad vs. Narrow Folksonomies. In: Proceedings of the 23rd ACM conference on Hypertext and

social media, HT '12, ACM, New York, NY, USA, pp 63–72, http://doi.acm.org/10.1145/2309996.2310008

3. Knautz K, Soubusta S, Stock WG (2010) Tag Clusters as Information Retrieval Interfaces. In: Proceedings of the 2010 43rd Hawaii International Conference on System Sciences, HICSS'10, IEEE Computer Society, Washington, DC, USA pp 1–10, http://dx.doi.org/10.1109/HICSS.2010.360
4. Koutrika G, Zadeh ZM, Garcia-Molina H (2009) Data Clouds: Summarizing Keyword Search Results over Structured Data. In: Proceedings of the 12th International Conference on Extending Database Technology: Advances in Database Technology, EDBT '09, ACM, New York, NY, USA, pp 391–402, http://doi.acm.org/10.1145/1516360.1516406
5. Rivadeneira AW, Gruen DM, Muller MJ, Millen DR (2007) Getting our Head in the Clouds: Toward Evaluation Studies of Tagclouds. In: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, CHI '07, ACM, New York, NY, USA, pp 995–998, http://dx.doi.org/10.1145/1240624.1240775
6. Seifert C, Kump B, Kienreich W, Granitzer G, Granitzer M (2008) On the Beauty and Usability of Tag Clouds. In: Information Visualisation, 2008. IV '08. 12th International Conference, pp 17 – 25, http://dx.doi.org/10.1109/IV.2008.89
7. Sinclair J, Cardew-Hall M (2008) The Folksonomy Tag Cloud: When is it Useful? Journal of Information Science 34(1):15–29, http://dx.doi.org/10.1177/0165551506078083