

Flickr: an Academic Image Resource?

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Introduction

Digital images are becoming increasingly prevalent thanks to significant developments in photographic technology. People are also now easily able to upload digital images onto ‘web 2.0’ picture-sharing sites. A common feature of web 2.0 sites is ‘tagging’ and this is where users assign “keywords in order to add metadata to content” (Nov, Naaman & Ye, 2008).

Research questions

This study explores whether the popular web 2.0 image site Flickr is used as an academic image resource, and addresses the following research questions: *What types of academic images are posted to Flickr and how do they differ between subject areas? Do particular subject areas lend themselves more easily for inclusion in Flickr? Does informetric term-frequency analysis of accompanying tags provide any additional insights into the types of images investigated?*

Understanding how ‘academic’ tags are applied to images on an individual subject level can be seen as the foundations from which to base future co-word (tag) investigations upon.

Methods

Flickr was chosen for this investigation for two main reasons. First, as of November 2008, Flickr held more than 3 billion images (Flickr, 2008). This makes Flickr an extremely rich source from which data can be taken. Second, Flickr also has its own Application Programming Interface (API) and this easily allows for the ethical extraction of image data on a large scale.

Four academic subject categories were randomly chosen from each of the three main ISI citation databases (The Arts and Humanities, the Science, and the Social Science Citation Indexes). From the resulting 12 categories, tags were then derived (see Figure 1).

URLs of 4,500 images for each derived subject tag were retrieved (e.g., “cellbiology”), or as many as were publicly available, using Flickr’s API. 50 random image URLs were then taken from the pools of 4,500 (or as many as were available).

Images were analysed by the first author, within the context of their associated tags, any groups the image was part of, and any additional information

attached to the image such as its title and comments from other users. Although a second classifier would have helped to reduce any classifier bias, as this was an exploratory study, a single classifier was acceptable. A bespoke iterative scheme was used for the analysis drawing upon Kindberg et al. (2005), Van House & Ames (2005), Shatford-Layne, (1994) and Jørgensen (2004) (see Table 1).

Results

A total of 4,695,530 images were identified using the Flickr API across the 12 subject categories. *Art* was the most common derived subject category, accounting for 94% of total images. The final sample consisted of 563 images. A total of 33% of images fell into category D (documenting the work of others), and this was closely followed by category C (the documentation of one’s own work/self-exhibition). Figure 1 shows the overall percentage of images that fell into each of the classification categories.

The results were analysed for their significance using a chi-squared test and the differences between the classification categories were found to be highly significant ($p = 0.000$).

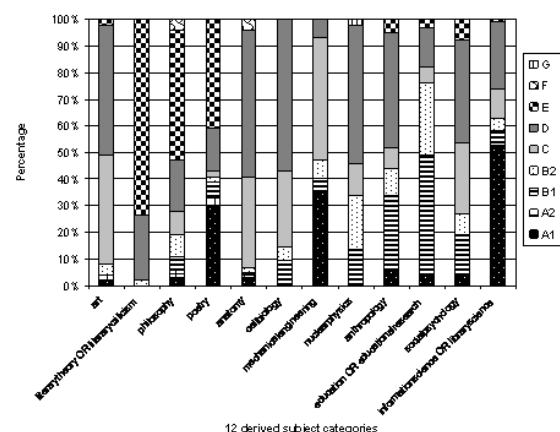


Figure 1. Image classification.

A term-frequency analysis was carried out on all of the tags which accompanied the sample of 563 images. Table 2 shows the top five associated tags for each of the 12 derived subject categories.

Table 1. Image content analysis scheme.

Image content analysis scheme			
Mutual experience (Kindberg et al. 2005)	People (informal)	Primary focus of image is 'people'. Intent to share with those who are known.	A1
	Places (informal)	Primary focus of images is 'places'. Intent to share with those who are known	A2
Absenteeism (Kindberg et al. 2005)	People (formal)	Primary focus of images is 'people' who are not known to the image owner	B1
	Places (formal)	Primary focus of images is 'places'. Intent not to share with those who are known.	B2
Self-Presentation/Expression (Van House & Ames, 2005)	Documenting one's work / Self-exhibition	Primary focus of image is the documentation or exhibition of oneself or of one's work. The accompanying image tags indicate either the ownership of the work, or indicate that the image is meant for self-exhibition.	C
Exemplified image (Shatford-Layne, 1994)	Documenting work of others / Exhibiting items	Primary focus of image is of another person's work. The accompanying tags indicate that the work is by someone other than the image owner.	D
Abstract concepts Jørgensen (2004)	Object/item/visual element	Primary focus of image is of portraying abstract concepts.	E
Non-relevance		e.g., images tagged by username, 'MrPhilosophy'.	F
Unable to determine		Relationship between the image and its tag(s) cannot be determined.	G

Table 2. Top five additional tags for each of the 12 derived subject categories.

S	literary theory OR literary criticism	philosophy	poetry	history OR anthropology	cell biology	mechanical engineering	microbiology	ethnology	science OR education OR social psychology	religion OR philosophy	information science
1	theory	theory	art	film	body	cells	science	science	school	school	school
2	theory	theory	art	film	body	cells	science	science	school	school	school
3	theory	theory	art	film	body	cells	science	science	school	school	school
4	theory	theory	art	film	body	cells	science	science	school	school	school
5	theory	theory	art	film	body	cells	science	science	school	school	school

Discussion

The derived subject category tags were found to have a high level of precision. Term-frequency analysis of associated tags provided valuable additional insights into user patterns. This can be most clearly seen in the cases of *literarytheory/literarycriticism* and *socialpsychology* where the 'unusual' associated tags can be attributed to the fact that most of the images had been uploaded by the same user, relating to the same event.

Some subject terms are more widely used than others. For example, whilst 'information science' is a unique term that is likely to only be used in relation to its academic meaning, the term art has a much wider spectrum of uses. The tag art could accompany a photograph of a child's drawing or a photograph of a famous painting but it seems that a child's drawing would be rarely valuable for art in the academic sense. This variation in term usage perhaps therefore creates a lower level of precision in the results for some subject categories. It also probably contributes to the noticeable differences in the number of images which are tagged with the 12 derived subject categories, with art alone accounting for 94% of the total images retrieved.

In addition to the above, the extent to which a given image can be classed as 'academic' is more widely questionable. For 'mechanical engineering' there were many photographs from graduations and although it is perfectly valid for such images to be tagged with the subject category of the degree in question these are not 'academic images' in the sense of being useful within the academic subject, unless for allowing people to gain an insight into academia.

This investigation does not take into account that

academics may use Flickr to search for images which bear no apparent connection to their subject discipline. This limitation could be addressed in the future by interviewing academics to discuss their use of image sites such as Flickr and image libraries generally.

Conclusion

The results illustrate that Flickr can be of use to academics as an image resource, although this is highly dependent upon subject area. Images documenting the photographer's own work and that of others proved to be the most popular type of image. The results indicate that images from *arts* based subjects lend themselves more easily for inclusion on Flickr.

References

- Flickr (2008). *Flickr Blog: 3 Billion!* Retrieved January 18, 2009 from: <http://blog.flickr.net/en/2008/11/03/3-billion/>.
- Jørgensen, C. (2004). The Visual Indexing Vocabulary: Developing a Thesaurus for Indexing Images Across Diverse Domains, 67th ASIS&T Annual Meeting, 41(1), Oct. 28 – Nov. 2, Charlotte, USA.
- Kindberg, T., Spasojevic, M., Fleck, R., & Sellen, A. (2005). The Ubiquitous Camera: An In-Depth Study of Camera Phone Use. *IEEE Pervasive Computing*, 4(2), 42-50.
- Nov, O., Naaman, M., & Ye, C. (2008). What Drives Content Tagging: The Case of Photos on Flickr, CHI 2008 Proceedings, April 5-10, Florence, Italy.
- Shatford-Layne, S. (1994). Some Issues in the Indexing of Images. *Journal of the American Society for Information Science*, 45(8), 583-588.
- Van House, N., & Ames, M. (2005). The Social Life of Cameraphone Images, UBICOMP '05 Pics workshop, The 7th International Conference on Ubiquitous Computing, Sept. 11-14, Tokyo, Japan.