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Using Text Surrounding Method to Enhance Retrieval of Online Images by Google Search Engine

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Abstract

Purpose: the current research aimed to compare the effectiveness of various tags and codes for retrieving images from the Google.

Design/methodology: selected images with different characteristics in a registered domain were carefully studied. The exception was that special conceptual features have been apportioned for each group of images separately. In this regard, each image group surrounding texts was dissimilar. Images were allocated with captions including language in Farsi and English, alt text, image title, file name, free and controlled languages and appropriation text to images properties.

Findings: allocating texts to images on a website causes Google to retrieve more images. Chi-square test for identification of significant differences among retrieved images in 5 Codes and revealed that in different codes, various numbers of images that were retrieved were significantly different. Caption allocation in English proved to have the best effect in retrieving images in the study sample, whereas file name had less effect in image retrieval ranking. Results of the Kruskal-Wallis test to assess the group differences in 5 codes revealed that differences were significant.

Originality/Value: This paper tries to recall the importance of some elements which a search engine like Google may consider in indexing and retrieval of images. Widespread use of image tagging on the web enables Google and also other search engines to successfully retrieve images.

Keywords: image indexing, image retrieval, semantic image retrieval, image tagging, Google , image annotation.

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Introduction

As a result of multimedia technology advances, visual information systems have been evolved in the fields of industry and research. Owing to the enhancing processing power of computers and storage devices available in large capacities, it is possible that a large volume of images to be stored. Nowadays, images are used in many areas such as medical examinations, picture archives, museum management, meteorology, engineering and architecture, libraries, geographic information systems, cartography and information about the earth, computerized interactive design systems, criminal investigations and law enforcement, and multimedia communications (El-Qawasmeh, 2003). In order to be useful to users, the images on the databases should be indexed according to the relevant concept and terminology.

Although technology has provided the possibility of accessing large image databases, however, it is inevitable to index and catalogue them by human indexers. If users know what image they are exactly looking for, such as specific title or author, they might find what they want but in many cases users' queries are more than a specific record (Roberts, 2001; Patil, and Durugkar, 2015). Many users are more interested in semantic existences than the visual aspects. For example, the study of the behavior of journalists by Markkula and Sormunen (2000) showed that journalists have searched real issues such as people, buildings, places, etc. in 56 percent of their queries. It is noteworthy that many images on the web are surrounded by semantic issues such as image title, image alternate text, image caption, page title and metadata (Jayaratne, 2006; Patil, and Durugkar, 2015). Ménard (2007) has divided images into three major categories: artistic, documentary and ordinary images. An image may be used for various intentions (artistic, visual resources and archive). Elaine Svenonius (1994) believes that the language of images and music cannot be fully translated to the words. What is expressed cannot reflect exact the same thing (Collins, 1998). Therefore, Jacobs (1999) believes that indexing images is something beyond the merely subject. He considers the issues such as camera angle, time of day in which the image is taken, type of the film and the target audience, in addition to the location and other information that are not easily identified in the images.

Such issues as lack of coherent metadata for images, poor accuracy of image search engines on the web, and lack of user understanding in web image searching have caused people to perceive their favorite image content with difficulty (Lee and Neal, 2010; Patil, and Durugkar, 2015) and they just search for name or time of images key terms. Since image titles generally do not provide descriptive information about the document content, the users, inevitably, themselves describe images by their content and subject. In many cases image examples are given to direct users for image retrieval. The basic idea of image retrieval by image example is to extract the characteristic features from target images which are then matched or compared with that of the query image. These features are typically derived from shape, texture, color properties or statistical features of the query and the target images. After matching, the images are ordered with respect to the query image according to their similarity measure and are displayed for viewing. It is what researchers in concept-based image retrieval are trying to do.

Some believe that the best way for image retrieval is relying on textual descriptions (Bar-Ilan et al., 2012) and level and extent of indexing is often determined by the nature of collections and the user needs (Booth, 2001). If the intention is identifying the image, everything about it is described by the terms except color, shape, and context. Images often are used not only for indicating a specific object, but also for expressing specific feelings (Westerveld, 2000), therefore, images contain more semantic layers compared to the text because every image is both “of and about something” and there is usually the difference between “ofteness and aboutness” in image indexing. Also, it should be notified that rapid advancement in communication and information technologies has led to and necessitate the increasing use of visual resources more than ever so that nowadays, images are considered as the main media on the web, though unlike books and periodicals, images don’t have page titles or other bibliographic information (Lee and Neal, 2010). The fact of the matter is that image databases are becoming more and more important in everyday life; therefore, there should be appropriate methods and techniques to enable users to uploading and retrieving images in digital image databases . It should be considered that on the one hand, image search and retrieval is an important and much-used aspect of the search engine market,

however, on the other, works on optimizing images and their metadata for indexing and retrieval is relatively limited.

Another point to consider is that making information accessible to as many people as possible is a way to add value to information (Stephen, 2009). Issues such as lack of a metadata consistent for images, low precision of current image search engines on the Web and misunderstanding of users in searching images on the Web has resulted in an inadequate understanding of the content of their favorite image while retrieving (Lee and Neal, 2010) Hence, they have to only rely on searching keywords of names or captions of images. Captions generally don't provide descriptive information about the content of the document so, users themselves have to describe their images. These descriptions can be expressed as a list of descriptors (keywords) or as a complete description of the natural language (Smits, Plu and Bellec, 2006).

Also, it should be considered that if the purpose is to identify an image, everything about it can be described by words except the color, shape, and texture. Images are not only for indicating an object, but also to express a particular feeling (Westerveld, 2000). Also, are among the users interests what is in the image, who has taken or created it, how and when it was created. In analogy with texts, images contain more semantic layers, because each image is "From something" and also "About something" and often there is a difference between "from" and "about". For more distinction between these two, science and technology are developing appropriate methods of indexing and retrieving images that could be, and has been, implemented in modern information retrieval systems like Google.

In the text-based method, descriptors are extracted from text descriptions to explain the parts of images and are applied again for managerial tasks (indexing, classification, and retrieval) (Smits, Plu and Bellec, 2006). Jung, Kim and Jain (2004) also believe that texts with images are useful for describing image content and can be extracted easily; and computer programs such as search and index software can improve text-based image retrieval.

Searching an image, it is likely to retrieve an image from a personal or organizational collection or on the Web, but one may face problem

or fail in retrieving that image by just using common words, concepts or even the name of that image. It is clear that several factors may be involved in this failure such as content, text, and keywords in storing and retrieving images, the inefficiency of search engines or inability of users to retrieve images. All in all, considering all the above mentioned issues, this article reflects two issues: 1. It would contribute to the existing knowledge especially in terms of Iranian academic environments; 2.This study considers factors such as text and keywords in indexing of images. On account of the current importance of images, some people believe that our generation emphasizes on texts and writings; but our children will emphasis on the image due to the technology progresses – since, apparently, our generation is witnessing that rapid developments in communication and information technology has led us to increase the use of visual materials in comparing of past time.

Literature review

In 2007 Google claimed that the users of this search engine have complete access to more than 2 billion images. Facing with this increase, people are thinking how to retrieve images easily. Yet more text search is undertaken for images; and success in retrieving depends on the consistency between the searching terms and additional texts and indexing terms (Ménard, 2007).

Research related to image indexing and retrieval in the past two decades has been developed. In the present research studies of importance of text concepts, image title, associated text for image, image annotation to increase number and rank of image retrieval are presented. There are different research and literature about image indexing and retrieval which could be somehow related to the current study. Since we explored the aim of the research by keeping conceptual frameworks in mind, the following publications were identified to be mentioned here.

Enser and McGregor (1993) studied 2722 queries and found that these queries could divided to four categories with two dimensions includes Unique, Non-unique, Refined, and Unrefined. Among them only queries related to unrefined subjects that was used by Gibbs-Smith

Classification Project for image archive, was satisfied (Cited in Chen and Rasmussen, 1999).

Bernard and Forsyth (2001) presented a statistical model for organizing image collections and integrated ready semantic data provided by associated text and visual data provided by image features. Azzam, Leung, and Horwood (2004) focused on Concept-based Image Indexing and developed a new method for image indexing and retrieval. Other researchers includes Jung, Kim, and Jain (2004), Ayache, Quenot, and Satoh (2006), Matusiak (2006), Rorissa (2008), Vadivel, Sural, and Majumdar (2009), Menard (2010), Setchi, Tang, and Stankov (2011), Fadzli and Setchi (2012), Vrochidis, Moumtzidou, and Kompstsiaris (2012), and Fauzi and Belkhatir (2013) conducted research related to image indexing and retrieval.

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Previous studies indicate methods used in indexing and image retrieval area in the two past decades have faced many changes. In comparison to content-based indexing, research in concept-based indexing of images is developed by Information Science researchers. Current work attempts to investigate the importance of using text concepts, image title, image alternate text, and caption in increasing rate of image retrieval using Google search engine which wasn't taken into consideration in previous works.

Research Questions

This research intends to answer the following questions:

Is there any difference in the level of retrieving the sample images of the research based on following variables in Google search engine?

- The use of controlled language
- The use of free language
- The use of file name
- The use of image caption
- The use of image alternate text
- The use of image description in the Persian language
- The use of image caption in the English language
- The use of the information of image formats such as subject and title
- No use of the above variables

Research Methodology

Current processes of indexing images include some methods which automatically extract image features or some methods which set up high-level concepts for images manually. The first method allows researchers to locate images on digital libraries based on their physical characteristics (color, shape, and texture) and the next locates them on the basis of their concepts. Research on indexing images also include two methods; the first one is essentially rooted in Computer Science and the second one is in Information Science (Chu, 2001). Given the above issues, in this research, we have considered concept-based image indexing which is in the field of the Information Science research agenda.

It is of high importance to mention that this paper is the result of a research project confirmed by and managed in Shahid Chamran University of Ahvaz, Iran. We also consulted some statistics experts for analyzing data so that to reach a degree of confidence in the accuracy of the methodology, data gathering and analysis of the collected data and reaching real and scientific results. The process of the research was controlled and managed by a set of faculty members in Library and

Information Science and Computer Science departments located at the SCU. The team was carefully aware about the complexity and importance of the research, thus an acceptable time approximate to one year has been allocated for conducting and finalizing the research.

The present research as an applied research, was based on Technology-Based Research as described by Powell, 1997, p.71

1000 images that were related to SCU website were retrieved. From them, 100 images were selected as research sample that was selected based on the potentiality of images for concept-based image indexing for individuals, subjects, objects, and image text. In addition, the researcher's evaluation and observations interfered. With FastStone Photo Resizer software, the standard resolution (640*480) for images was selected. Then unique codes were assigned to each image. For example T, for image title, A, for Alternative text for images, P for image Properties and so on. Each selected images was uploaded 9 times on the http://iiproject.ir domain. In other words, for each image 9 similar images i.e. a total of 900 images were uploaded on this website, while each image with a unique code had a special conceptual specificity.

Figure1. Example of a coded image: Sign T is placed as image Title text at bottom right side (http://iiproject.ir/ImagetitleT.html) May 7, 2016

In the current research Hard Indexing (Krause, 1988) method was used through which method, indexer in describing images, emphasizes on objects, observable subjects, and events in images. Then, a web domain namely iiproject.ir was registered and research data with 72MB

was uploaded which were accessible via the web right now. Also, HTML4, Notepad++, and CSS2.3 was applied for identifying HTML text format attributes. Persian Cultural Thesaurus (ASFA) and NAMA thesaurus managed and published by the National Library and Archives of Iran and Iranian Research Center for Information Science and Technology[4] were applied for the task of using controlled indexing and vocabulary. Images with different tags were searched by Google to be find out whether the images' tags and annotations were considered by Google and which kinds of tags were more important for Google.

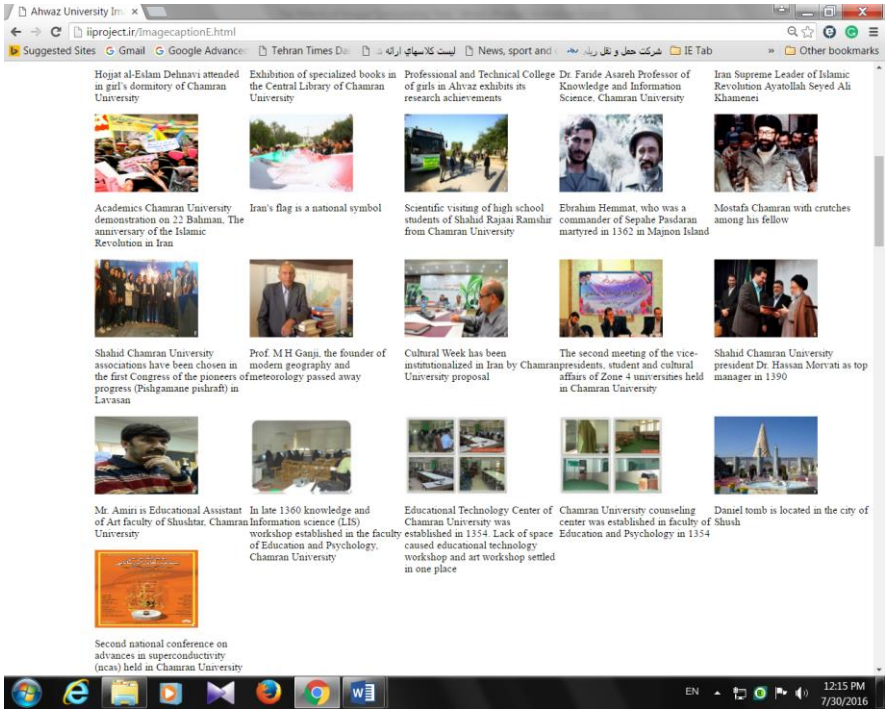

Figure2. A sample page used for the study is available at: http://iiproject.ir/PropertiesP.html (accessed July 30, 2016)

[4] . For more information: http://opac.nlai.ir/opac-prod/bibliographic/2519141 and http://opac.nlai.ir/opac-prod/bibliographic/629675

Following loading images on the allocated website, and their indexing by Google search engine, site operator command was used so that all images of research sample were retrieved by Google. Hence, the order of placement of images was specified. That is, images with properties which are more important for Google were placed at a higher rank.

For investigation of research sample, hard indexing (Krause, 1988) or first level indexing introduced by Panofsky (1955) was used for artistic images, which later was used under the title of *Ofness indexing* by Layne (1986). In this type of indexing, indexer emphasizes objects and subjects visible in the image, and uses existing objects and events in the image in determining the description level of images, unlike soft indexing or second and third level indexing by Panofsky, which Layne then introduced it as *about* indexing, and includes subjective evaluation and interpretation of indexer individual. Krause (1988) distinguishes hard indexing (description of what visible by indexer in the image) and soft indexing.

During the time images were indexed by Google, we discovered that Google had indexed the website that we uploaded our images sooner than other search engines and browsers like Yahoo and Bing. Therefore, we were interested to see whether passing the time had effected the image retrieving rate or not. The results would be the same if we undertake a second similar research. Google was not only the most popular and market share search engine, but the first one which indexed the images of the study. As a result, Google was selected as the environment in which the study was conducted. As was mentioned earlier, images with different tags were searched by Google to be see whether the images' tags and annotations were considered by Google or not, and to find out which kinds of tags were more important for Google. We also focused on the concept based image indexing instead of content based image indexing so that the differences and the variety existed in the sample images didn't count in indexing. In the former method, the emphasis is on human edited descriptions to images while in the latter automatic and computerized assignments and descriptions to the images are taken into account when publishing images online (Chu, 2001). The content method allows researchers to locate images on digital libraries based on their physical characteristics while the next

method locates them on the basis of their concepts. As a result, research on indexing images includes two methods; the first one is essentially rooted in Computer Science and the second one is in Information Science (Chu, 2001). Given the above issues, in this research, we considered concept-based image indexing which is in the field of the Information Science research agenda. In other words, image retrieval would be improved when indexing images is to be done by human editors and indexers. By keeping such issues in mind, the reserchers preferred to use concept based image retrieval than the other method when managing the research project.

After about two months of indexing images by Google, every image combined with its tags was searched in Google and the results were recorded. At this stage, some well-known Persian thesauri like ASFA and NAMA were used to designate standard keywords for captions, file names, and ALT texts to each image. The four collections of images were not retrieved by Google so we couldn't take them into consideration. It is also a concern why Google could not retrieve such collections with appropriate texts.

Chi-square test was used for comparing retrieved image frequencies between groups and Kruskal-Wallis test was used for comparing mean ranks in 9 groups as well as the Mann-Whitney U test that was used for comparing mean ranks between each of the two groups.

Table 1.Codes assigned to the sample images

TG	Image Title
AG	Alternative Text for the image
GG	Image annotation in Persian
EG	Image annotation in English
NG	File Name
FG	Free Language
CG	Controlled Language
PG	Image Properties
QG	Images with no change

Research Findings

Research findings are presented for assigned codes for images and their retrieval effectiveness concerning frequencies and ranks of image retrieval.

Table 2. Descriptive indicators for retrieved images in Google

Statistics	Frequency	Mean	Standard Deviation	Minimum	Maximum
Controlled language	93	45.45	118.678	1	563
Name file	58	97.79	151.076	1	553
Free language	76	3.08	6.136	1	38
Image annotation in English	98	1.19	1.919	1	20
Image annotation in Persian	92	1.09	.283	1	2
Total	417	24.82	86.196	1	563

Table 2 shows descriptive indicators of retrieved sample images in Google. As table shows, 417 images were retrieved out of a total of 900.; Also, mean, standard deviation, minimum and maximum number of retrieved images in each indicator is presented. The maximum retrieved images were that of Image annotation in English (E) with 98 images, and the minimum retrieved images was that of Name file (N) with 58 ones. Results of the study revealed that among the five indicators, image annotation indicator had the most impact on image retrieval. Consequently, weblogs and websites with this point in mind, are expected to have more chance to be retrieved by Google.

To answer the research questions, we searched every tag and keywords assigned to images in Google and recorded numbers of retrieved images. Among 9 codes, we retrieved no image in 4 codes including image title, associated text for image, image format data, and unchanged images, thus, 5 remaining codes were included in the analysis (table 3).

Table 3. Frequency of retrieved images in five codes

Retrieval codes	Observable frequency	Expected frequency	Remained value
Controlled language (CG)	93	83.4	9.6
Name file (NG)	58	83.4	-25.4
Free language (FG)	76	83.4	-7.4
Image annotation in English (EG)	98	83.4	14.7
Image annotation in Persian (GG)	92	83.4	8.6
Total	417		

As table 3 shows, in the five remaining retrieval codes, maximum and minimum of observable frequency were 98 and 58 that related to Image annotation in English (EG) and file name (NG), respectively. Thus, comparing with other codes, assigning Image annotation in English (EG) for sample images had the most impact on image retrieval, followed by other codes including Controlled language (CG) and Image annotation in Persian (GG).

Table 4. Frequency difference of retrieved images in five codes

Statistics	Numerical value
Chi-square	12.940
DF	4
Significance level	0.012

As table 4 shows, running a Chi-square test revealed that in the given five codes, the frequency of retrieved images was significantly different (S2= 12.940 and P=. /012)

Table 5. Retrieval ranks of images in five codes

Retrieval codes	Frequency	Ranks mean
Controlled language (CG)	93	260.15
file Name (NG)	58	323.64
Free language (FG)	76	214.45
Image annotation in English (EG)	98	141.37
Image annotation in Persian (GG)	92	152.57
Total	417	

Table 5 shows, in five retrieval codes, minimum the ranks means. The values indicate that comparing with other codes, Image annotation in English (EG) has the best retrieval rank, and then is the Image annotation in Persian (GG), while file Name (NG) has the least retrieval rank. It indicates that assigning image annotation in English (EG) and in Persian (GG) have increased image retrieval ranks.

Table 6. Kruskal-Wallis test for measuring difference between retrieval ranks in five codes

Statistics	**Numerical value**
Chi-square	170.505
DF	4
Significance level	0.000

As table 6 shows, Chi-square is 170.505 and significant in P=. /000 significance level indicating that in five codes given, retrieval ranks of images is significantly different.

Chi-square test for measuring frequencies difference of retrieved images, and Kruskal-Wallis test for measuring ranks mean difference of retrieved images in five codes demonstrate that differences are significant, as a results, we used the Chi-square test for measuring frequency difference of each two groups separately, and also, Mann-Whitney U test for comparing ranks mean differences of the retrieved images in each two groups, separately. We used *free language* as a criterion for comparing with other groups.

Table 7. Chi-square test for frequencies difference of retrieved images for comparing FG with other codes

Code	**CG**	**NG**	**EG**	**GG**
FG	1.71	2.41	1.71	1.52

As Table 7 shows, Chi-square test for FG (Free language) in comparison with CG (Controlled language) code is 1.71 that shows not significant at P<0.0001 (significance level).. The same rationale exists with other codes. In other words, there is not a significant difference in retrieved images frequencies between free language (FG) in

comparison with Controlled language, file Name, Image annotation in English, and Image annotation in Persian.

Table 8. Images retrieval ranks mean in CG and FG codes

Groups	Frequency	Ranks Mean	Ranks total
Controlled language (CG)	93	95.31	8864.00
Free language (FG)	76	72.38	5501.00
Total	169		

As table 8 shows, retrieval rank mean for CG code is 95.31 and retrieval rank mean for FG code is 72.38. Therefore, FG code in comparison to CG code, although with fewer retrieval incidents, possesses a better retrieval rank.

Table 9. Mann-Whitney U tests for retrieval rank in two CG and FG groups

Statistics	Numerical value
Mann-Whitney U	2.575
Z	-3.250
Significance level	0.001

As table 9 indicates, Mann-Whitney U test value is 2.575 which demonstrates significance at the P=.001 Significance level. Therefore, unlike frequencies difference test, retrieval ranks in the two groups are significantly different. In other words, FG code has better retrieval rank in comparison with CG code.

Table 10. Image retrieval ranks mean for NG and FG codes

Groups	Frequency	Ranks Mean	*Ranks total*
File name (NG)	58	91.22	5291.00
Free language (FG)	76	49.39	3754.00
Total	134		

As table 10 shows, retrieval rank means for NG code is 91.22 and retrieval rank mean for FG code is 49.39. Therefore, FG code ranks better in comparison with CG code.

Table 11. Mann-Whitney U Difference test for retrieval rank in two NG and FG groups

Statistics	**Numerical value**
Mann-Whitney U	828.000
Z	-6.417
Significance level	0.001

To test the difference between the ranks of the two groups of NG and FG codes, the Mann-Whitney U test was run results of which is shown in table 11. As the firures in table 11 indicate, the Mann-Whitney U is 828.000 which indicates significant at P=.001 Significance level. Therefore, unlike frequencies difference test, retrieval rank in the two groups is significantly different. In other words, FG code has a higher retrieval rank in comparison with NG code.

Table 12. Images retrieval ranks mean in EG and FG codes

Groups	***Frequency***	***Ranks Mean***	***Ranks total***
Image annotation in English (EG)	98	72.02	7058.00
Free language (FG)	76	107.46	8167.00
Total	174		

The same difference test similar to the earlier was performed results of which is shown in table 12, indicating retrieval rank mean for EG code is 72.02 and retrieval rank mean for FG code is 107.46. Therefore, EG code ranks higher in comparison with FG code.

Table 13. Mann-Whitney U test for retrieval rank in two EG and FG groups

Statistics	**Numerical value**
Mann-Whitney U	2.207
Z	-6.735
Significance level	0.001

To assess whether the EG and NG codes rank significantly different, the Mann-Whitney U test was run results of which is shown in table 13. Gaining a U value of 2.207 indicates that the EG and NG codes ranks differ significantly at P=.001 Significance level. Therefore, retrieval rank in two groups is significantly different. In other words, images that had EG codes in comparison with NG code have better retrieval rank.

Table 14. Image retrieval ranks mean for GG and FG codes

Groups	***Frequency***	***Ranks Mean***	***Ranks total***
Image annotation in Persian (GG)	92	71.11	6542.00
Free language (FG)	76	100.71	7654.00
Total	168		

As table 14 shows, retrieval rank mean for EG code is 71.11 and retrieval rank mean for FG code is 100.71. Therefore, GG code in comparison with FG code is higher by retrieval rank. Likewise previous, the Mann-Whitney U test was used to test the significance of difference between the two GG and FG codes results of which are presented in table 15.

Table 15. Mann-Whitney U test results for retrieval rank for the two GG and FG groups

Statistics	**Numerical value**
Mann-Whitney U	2.264
Z	-5.271
Significance level	0.001

As table 15 shows, Mann-Whitney U test is 2.264 and is significant in P=.001 Significance level. Therefore, unlike frequency difference test, retrieval rank in two groups is significantly different. In other words, images that had GG codes have higher retrieval rank in comparison with NG code.

Discussion

As it was described throughout the article, in the present research, different methods of indexing and their impacts on image retrieval through the use of Google search engine were examined on 100 images that were selected from SCU website. Also, a website was created as the research ground the selected images to be uploaded on it. From each sample image 9 extracted images with a totalof 900 items were constructed. The effectiveness of features assigned to images was then taken into consideration through measuring the numbers of the retrieved images and their ranks.

From the findings of the study, it is found out that image annotations either in English or in Persian would have a clear impact on image retrieval rate. Thus, uploading annotated images on websites and weblogs would increase the retrieval incidences ofthe relevant images in Google. This finding is important since it urges adoption of effective mechanisms to improve image indexing and retrieval in online environments. Although different in research methodologies, the findings of the current research is comparable to that of some other researchers like Setchi, et.al (2011), Fadzli and Setchi (2012) or Smits, Plu and Bellec (2006) in which annotation properties of the images proved to have influential effects on improving image retrieval. These findings also reveal the fact that intellectual assignment of annotation by human users could remarkably change the way a given image would be retrieved. The manual assignment of annotations alongside the computerized metadata assignment to images could improve the chance of images to be indexed and retrieved. Using specialized, detailed and standard descriptions to intended images is a key factor of the image publishing on the web which should not be ignored by systems designers and developers.

From the results of this study, it seems that features of image annotation in English and Persian are important for improvement of retrieval ranks. However, assigning file name to images seems to have the least impact in retrieval rank. Another point is that free language (FG) had better retrieval rank in comparison to other four codes mentioned earlier. This is a key finding and in line with some previous research (Rorissa, 2008) because indexing by free language as users

could assign is a solution that designers and developers of the different websites may apply for better image retrieval.

Based on the findings, in order for images to be indexed better, it is suggested that text-based descriptions could be assigned to image title, associated text, and available metadata. Also, for better search and retrieval in web-based image search engines, especially Google, use of associated texts for images is suggested. Users, corporations, and associations that upload their images on the web should assign some descriptions to images, image title, image annotation, and image format. Finally, image websites and databases should inform users about the importance of image tags and provide them with the possibility of tagging images by users.

To improve the application of associated text for images and its positive impact on image retrieval rate in image search engines, there appears a need for more research including the following:

1. Conducting research on other search engines like Yahoo, Bing, etc.
2. Study the information behavior of users while practicing searching images with regard to their aims and purposes, search mechanism and queries
3. Conduct research based on the comparison of content-based versus context-based indexing methods
4. Conducting surveys on users' needs and satisfaction of image search engines.

Conclusion

Generally speaking, as far as the aims of the present study are concerned, it seems that Google search engine is planned in a complex manner so that images with certain codes get better retrieval rank, and other images get better retrieval number. It seems that methods of image retrieval in Google for different parts of the image (image title, image alternate text, image caption, etc.) is not set to be fixed, and Google performs retrieval action differently for different image properties. Obviously, companies that are in search engine business, especially

Google, consider specific indexing algorithms of their own that might be kept secret for security reasons.

Moore discussion on such algorithms and indexing rules requires more scrutiny and further studies. However, as far as the findings of the present study are concerned, Google search engine seems to be capable of indexing and retrieving images, however, it looks not to be adequately capable of retrieving images from a website. If image collections lack suitable descriptive annotations, they will not be retrieved. Therefore, it is advisable that those in charge of image databases should aware their users and database managers to care about adding suitable descriptive annotation to images and allow them add various tags to images themselves, whenever it is required – something that might reminds us of development of folksonomies!

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