*National Workshop-Cum-Conference on Recent Trends in Mathematics and Computing (RTMC) 2011*
*Proceedings published in International Journal of Computer Applications® (IJCA)*

# Query by Image for Efficient Information Retrieval: A Necessity

Divya Chadha
Maharishi Markandeshwar University
Mullana-Ambala (Haryana), India.

Narender Singh
Maharishi Markandeshwar University,
Mullana-Ambala (Haryana), India

## ABSTRACT
For the past many years we are using search engine for image retrieval. These search engines use shapes, contents, text, and caption based approach for getting relevant image from the web repository. This image repository contains billions of 2D and 3D images as well as relevant information about those images. For shape based approach user has to give dimensions of that particular image for getting relevant response.

This paper describes the necessity of an efficient search engine for retrieving information about an image by uploading an image on the search engine or giving image as a query for retrieving information related to that particular image. It can be proved very helpful for a novice user who is searching information about an unknown or unfamiliar logo or image.

## Keywords
Search engine, shape retrieval, shapes matching, Content Based Visual Query, World Wide Web.

## 1. INTRODUCTION
Search Engines have become a popular way of finding information on the World Wide Web (WWW). Exploring visual data on text based search engine is beyond capability. To explore it, user assumes that textual description of visual data is available. But pictorial data is hard to be described by verbal description. We need a search engine that accepts pictorial image query to find the data.

With these features, speed ups or rapid search of image is also a matter to be considered. This technique will prove to be very beneficial Archaeology, study of past human societies, primarily through the discovery and analysis of material. If a person from forensic or archeology needs some information related to a seal, a picture a logo, or any other image they can very easily upload that image and can find out the information as well as relevant Uniform Resource Locator (URL) related to that image. That thumbnail or icon must contain hyperlink for enlarging and shrinking of that image.

## 2. RELATED WORK
This paper basically reviews the related work done by many researchers in field of efficient image search. The paper is the comparative study of various techniques and methods being used and described to formulate the search query so that most relevant information can be made available to the user.

R. Barber et al. [1] described Query by Image Content (QBIC) techniques which serve as "information filters" and simply reduce the search for the user who will ultimately discard false calls. Interactivity of QBIC technology is the key, allowing the user to use visual query and visual evaluation and refinement, and to decide what to discard and what to keep. It contrasts QBIC technology with typical machine vision applications.. The key technical problems and challenges are: how to represent the images so they can be easily queried, what are the similarity measures that best match human or application requirements, cost of digital data entry (scanning, outlining etc.), and how to have all of this done economically and efficiently (database, system and user interface issues).

The data that a user obtains as a result of pictorial query should appear as an icon, textual information about that image A very important question is what will be a user Query in case he has an image but no info about that. User will not get relevant information in any case. The Systems that were previously using this type of searching were not appropriate for 3D searching. But with shape based method and graphic hardware we can include 3D images also in our search.

The four main steps for retrieval of image information include Crawling, Indexing, Querying by uploading images and matching of image and results. The main pictorial features are also very important for searching images such as Color variation, color saturation, color transition strength, color background, grayness etc. Images are cataloged on the basis of these features. There exist various formats for images that also play an important role in searching of appropriate image and search engine is supporting up to which level.

There are many image search engines that need dimensions, file size and type as query to find image but it can give wrong results and time consuming because it is not necessary that user has such information.

The rest of the paper is organized as follows. In Section 2 related literatures is presented. In Section 3 Issues related to topic are discussed.
Finally, in section 4, we draw conclusion and possible research directions and suggestions are commented.

D. Lee et al. [2] described QBIC indexing algorithms that allow the multi-queries to run efficiently. This paper deals with the problem of querying large on-line image databases, where the queries are content-based and complex. To enable such queries, it is necessary to combine methods from image pattern recognition (to detect and represent the content-based features) and database technology -to efficiently index and retrieve the relevant images based on those features).

D. Lee et al. [3] described a technique for user interface which allows a user to graphically pose and refine queries based on multiple visual properties of images and their objects. The emphasis of this paper is the graphical user interface we have developed that allows users to pose these queries and the facilities it provides to construct "multi-queries" involving global images features.

Flickner M. et al. [4] described the QBIC system developed to explore content-based retrieval methods. QBIC allows queries

on large image and video databases based on example images, user-constructed sketches and drawings, selected colour and texture patterns, Two key properties of QBIC are (a) its use of image and video content-computable properties of colour, texture, shape, and motion of images, videos, and their objects-in the queries, and (b) its graphical query language in which queries are posed by drawing, selecting, and other graphical means.

John R. Smith et al. [5] described a visual information system prototype for searching images and videos on the World Wide Web. New visual information in the form of images, graphics, animations and video is being published on the web at incredible rate. This paper described a complete system by which visual information on web (a) is collected by automated agents (b) processed in both text and visual feature domain. (c) Catalogued and (d) indexed for fast search and retrieval. This paper introduced a video and image search engine which utilizes both text-based navigation and content based technology for searching visually through catalogued images and video.

Theo Gevers's [6] described an image search system by which visual information is effectively collected. They described a system PicToSeek that allows for fast online image search by combining visual browsing through pre-computed image catalogue and can search with query by pictorial example and query by image feature.

L Taycher et al. [7] described Image Rover Search Engine, an image content navigation tool for www. The paper described two key components of the Image Rover strategy: image digestion and relevance feedback. Image digestion modules extract information about the distribution of various image properties present in an image. The system employs a novel relevance feedback algorithm.

C. Frankel et al. [8] described Web Seer, a system for locating images on web. Web Seer uses image content in addition to associated text to index images, presenting the user with a selection that potentially fits his needs.

A. Soffer and H. Samet [9] described **A** pictorial query specification that consists of a query image, and a similarity level that specifies the required extent **of** similarity between the query image and database images that are to be retrieved. The query image is constructed by positioning objects so that the desired locational and spatial constraints hold. Algorithms for retrieving all database images that conform to a given pictorial query specification are presented and compared. System matches the user's notion of similarity. This paper introduce a method for specifying queries to an image database pictorially that enables the user to indicate the type of similarity between the query image and the database images that is required.

M. Beigi et al. [10] described a technique that evaluates MetaSeek, a content-based meta-search engine used for finding images on the Web based on their visual information. MetaSeek is designed to intelligently select and interface with multiple on-line image search engines by ranking their performance for different classes of user queries.

S. Paek and John R. Smith [11] described a technique to greatly improve cataloguing and indexing of image on web, this paper developed a prototype rule-based system that detects the content image in web documents. Content images are images that are associated with main content of web document, as opposed to multitude of other that exist in Web document for different purpose such as decorative, advertisement and logo images. This system presents a system that uses decision tree learning for automated rule induction for content image detection system. This system uses visual features, text related features and document context of image in concert for fast and effective content image detection.

T. Funkhouser et al. [12] described search engines for 3D models focus on new matching algorithm that uses spherical harmonics to compute discriminating similarity measures without requiring repair of model degeneracy or alignment of orientations. The research work is based on searching 3D images and algorithm. Work is done in area of shape based retrieval and analysis of 3D model.

M. Datcu and K. Seidel [13] described the field of remote sensing (RS) data dissemination and interpretation. For the new generation of high resolution sensors the volume of data increases drastically. The diversification of applications and of the user's interest requires new concepts for data access and interpretation. The main problems encountered in the design of such systems are data and information representation, coding and understanding, and the adaptation to the user Conjecture. The key issue is the augmentation of the data with meaning, to take into consideration the model of user's understanding.

Anchizes et al. [14] described a new model for query by image similarity. The model utilizes a fuzzy logic approach to cluster intrinsic image characteristics, which are extracted from sub regions of the image. The clustering process provides a set of parameters that are used to compare a target image with a group of images. As a result, the system provides the images in the data set which are similar to the target image. It presents as an example some queries by similarity on an image database composed of 20 types of animals. The main objective of this model is to develop an intelligent image query system that can be applied on the web and image databases.

X. S. Zhou and T. S. Huang [15] described structural features for content-based image retrieval (CBIR), especially edge/structure features extracted from edge maps. The feature vector is computed through a "water-filling algorithm" applied on the edge map of the original image. The purpose of this algorithm is to efficiently extract information embedded in the edges. The new features are more generally applicable than texture or shape features. Experiments show that the new features can catch salient edge/structure information and improve the retrieval performance.

N. V. Shirahatti and K. Barnard [16] described a comprehensive strategy for evaluating image retrieval algorithms. Because automated image retrieval is only meaningful in its service to people, performance characterization must be grounded in human evaluation. Thus it contains collection of a large data set of human evaluations of retrieval results, both for query by image example and query by text. The data is independent of any particular image retrieval algorithm and can be used to evaluate and compare many such algorithms without further data collection. It demonstrates the process by providing grounded comparison results for several algorithms.

D. N. F. Awang et al. [17] described a common approach to content-based image retrieval. It is to use example images as queries; images in the collection that have low-level features similar to the query examples are returned in response to the

query. It explores the use of image regions as query examples and compares the retrieval effectiveness of using whole images, single regions, and multiple regions as examples. It also compares two approaches for combining shape features: an equal weight linear combination, and classification using machine learning algorithms. It presented that using image regions as query examples leads to higher effectiveness than using whole images, and that an equal weight linear combination of shape features is simpler and at least as effective as using a machine learning algorithm.

V.Vani and S. Raju [18] described a Histogram intersection technique that is used for shape based retrieval. The advantage of this method is to attempts to capture semantic concepts by learning the way that images of the same semantics are similar and retrieving image clusters instead of a set of ordered images The features for target images (images in the Database) are usually precomputed and stored as feature files. Using these features together with an image similarity measure, the resemblance between the query image and target images are evaluated and sorted

H. Mülle et al. [19] described a technique for Content-based visual information retrieval (CBVIR) or content-based image retrieval (CBIR). It has been one on the most vivid research areas in the field of computer vision over the last 10 years. The availability of large and steadily growing amounts of visual and multimedia data and the development of the Internet underline the need to create thematic access methods that offer more than simple text-based queries or requests based on matching exact database fields. There are many questions with respect to speed, semantic descriptors or objective image interpretations are still unanswered.

W Zhang et al. [20] described a technique of similarity retrieval in images having goal to get the similar images quickly and accurately in high-dimension space.. This paper presents method to improve the retrieval speed without great lost of accuracy. It proposes a filtering method to greatly reduce the search range based on two assumptions: (a) the similar images will have similar amount of SIFT (scale invariant feature transform) features; (b) the similar images will all contain the important features. Experimental results show that this approach can significantly reduce the time complexity.

S. M. Yoon1 and A. Kuijper [21] described a technique in which a user-drawn sketch method for Human Computer Interaction. Users can express their intention by sketching the specific characteristics of a target object as a rough and simple black and white hand-drawn draft image. Recent advances of tablet PC and multi-touch screen technology raised increasing interest on how users might search and retrieve the desired images in databases from a simple sketched image. This paper presents a new approach for content based image retrieval from a query by sketchy draft images which are not in the database.

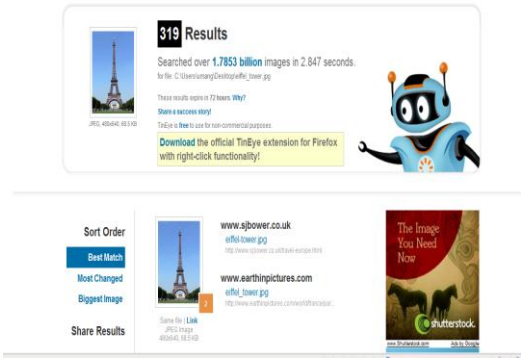


**Figure 1: Comparison Results of Tin Eye**

[22,23] A very important work that gave a new path way to this review was a Search Engine that accepts image as an input to retrieve information about image. TinEye is a reverse image search engine developed and offered by Idée, Inc., a company based in Toronto, Canada, which was founded by Leila Boujnane and Paul Bloore in 1999. The use of the Web application is free of charge for customers. TinEye is the first web-based image search engine to use image identification technology. A user uploads an image to the search engine limited to 1 MB.or provides a URL for an image .The search engine will look up other usage of the image in the internet including their time of appearance and including modified images based upon that image. This includes smaller, larger, and cropped versions of the image. TinEye is capable of searching for images in JPEG, GIF, or PNG format. Figure 1 shows comparison results an image search for Eifel tower shows 319 results

[24] describes Image search engine Gazopa is the Third TechCrunch50 company from Japan. Gazopa uses proprietary image analytics technology to extract information such as color and shape from images. It then identifies similar pictures from a pool of about 50 million different images found around the web. Gazopa's big idea is to render keywords obsolete when it comes to image search. Instead of typing search terms, Gazopa's visual engine lets users upload their own images or right-click on ones found on any webpage, Gazopa has a better chance of success because of its large database and the ubiquity of digital and phone cameras today. However, the panelists brought up the question of whether Gazopa was just a feature or a full-fledged product upon which a real business could be built. Figure 2 shows comparison result.

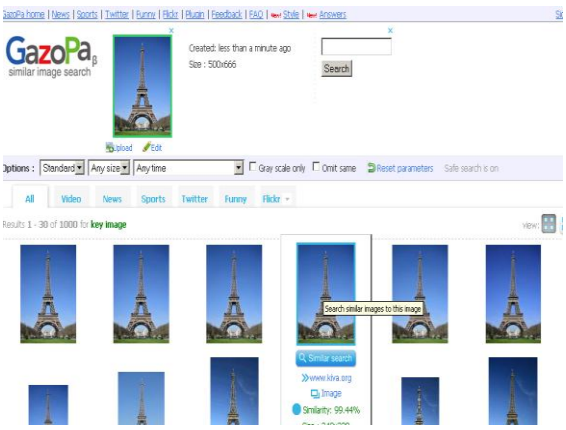


**Figure 2: Comparison Result of Gazopa**

## 3. ISSUES

There are various issues related to the described technology. The need of its emergence is felt because of some drawbacks in traditional methodology for finding images on search engines. For searching images on various search engines we can search by giving various parameters like dimensions, file type, size, and texture.

One of the Issues here is repository i.e. database of images. There is need to store an image in various formats, size. Sometimes there is variation in viewpoint with different object orientation that yields different shading, highlighting. Difference in illumination changes photometric composition of light. So, if a user wants to get relevant result it is very important to have large database of a particular image from various angles. Second problem that may arise while searching is popularity of that image that we are searching. The more popular the image is more number of results we can get. If that image is not so popular, database doesn't contain large number of images or information related to it. Matching algorithm will not be able to retrieve that image. So, retrieving appropriate data and images here depends on image features and search engine capability.

## 4. CONCLUSION

Our survey covers the review of various existing image retrieval techniques from web. Some search engines uses image feature like size, dimensions, color, texture to retrieve information and images related to that image. But focus is to highlight the necessity for a mechanism that could help a user for getting relevant information and knowledge about an image about which he has no prior information or knowledge. Only input with user is that image itself. There should be a browse and upload option with search image. And the result should be in the form of URL, image and related information. There must be efficient matching algorithms. The problem related to image matching can only be removed with proper number of images in database. Introduction of 3D images is very necessary in described system. With inclusion of all above mentioned requirements, it will be easy to retrieve images faster.

## 5. REFRENCES

[1] R. Barber, W. Equitz, M. Flickner, W. Niblack, D. Petkovic, P. Yanker IBM Almaden Research Center San Jose CA *"Efficient Query By Image Content For Very Large Image Databases"*, IEEE 2003.

[2] D. Lee, R. Barber, W. Niblac, M. Flickner J. Hafner, and D. Petkovic IBM Almaden Research Center San Jose, CA 95120, *"Indexing for Complex Queries on a Query-By-Content Image Database"*, IEEE 1994.

[3] D. Lee, R. Barber, W. Niblack M. Flickner, J. Hafner, and D. Petkovic IBM Almaden Research Center, San Jose, CA 95120, *"Query By Image Content Using Multiple Objects And Multiple Features: Users Interface Issues"*, IEEE 1994.

[4] Flickner M. et al., *"Query By Image and Video Content"*, the QBIC System, IEEE Computer, Vol. 28, No. 9, 1995.

[5] John R. Smith and Shif fu Chang, "*An Image and Video Search Engine for World Wide Web"*, IS&T/SPIE Proceedings, Storage & Retrieval for Image and Video Databases V, 1997.

[6] Theo Gevers *"PicToSeek: A Content-based Image Search System for the World Wide Web"*, IEEE 1996. http://target.wins.uva.nl:5345 / ret_user

[7] Leonid Taycher, Marco La Cascia, and Stan Sclaroff, *"Image Digestion and Relevance Feedback in the ImageRover WWW Search Engine"*, BU CS TR97-014, to appear in Proc., Visual 1997, San Diego, 12/97, 1997.

[8] Charles Frankel, Michael J. Swain, and Vassilis Athitsos, *"WebSeer: An Image Search Engine for the World Wide Web*", Technical Report 96-14, 1996.

[9] Aya Soffer , Hanan Samet , *"Pictorial Queries by Image Similarity",* Proceedings **of** ICPR '96, IEEE 1996.

[10] Mandis Beigi, Ana B. Benitez, and Shih-Fu Chang, *"MetaSEEk: A Content- Based Meta-Search Engine for Images"*, IEEE 1997.

[11] Seungyup Paek , John R. Smith, *"Detecting image purpose in world wide web"*,IEEE 1998.

[12] T. Funkhouser, P. Min, M. Kazhdan, J. Chen, A. Halderman, D. Dobkin, and D. Jacobs, *"A Search Engine for 3D Models*", ACM Transactions on Graphics, Vol. V, No. N, 10, 2002.

[13] Mihai Datcu' and Klaus Seidel. *"New-Concepts For Remote Sensing Information Dissemination Query By Image Content And Information Mining"*, IEEE 1999.

[14] Anchizes do E. L. GonÁalves Filho , Guilherme L. A. Mota, Marley M. B.R. Vellasco , Marco A. C. Pacheco, *"Query by Image Similarity Using a Fuzzy Logic Approach"*. 2000

[15] Xiang Sean Zhou and Thomas S. Huang. *"Edge-Based Structural Features For Content-Based Image Retrieval",* MIR'05, November 11-12, Singapore, 2005., ACM 2005.

[16] Nikhil V Shirahatti, Kobus Barnard *"Evaluating Image Retrieval"*, Proceedings of the 2005 IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR'05), IEEE 2005.

[17] D. N. F. Awang Iskandar James A. Thom S. M. M. Tahaghoghi, *"Content-based Image Retrieval Using Image Regions as Query Examples"*, Nineteenth Australasian Database Conference (ADC2008), Wollongong, Australia, January 2008.

[18] V.Vani, Sabhtta Raju, *"A Detailed Survey on Query by Image Content Techniques"*, Recent Advances in Networking, VLSI and Signal Processing, ISSN: 1790-5117, 2008.

[19] Henning Mülle, Nicolas Michoux, David Bandon, Antoine Geissbuhler, *"A Review Of Content-Based Image Retrieval Systems In Medical Applications—Clinical Benefits And Future Directions"*. 2009

[20] Weifeng Zhang, Shuaiqiu Men, Lei Xu Baowen Xu,, *"Feature Distribution Based Quick Image Retrieval"*. 2010

[21] Sang Min Yoon1, and Arjan Kuijper2. *"Query-By-Sketch Based Image Retrieval Using Diffusion Tensor Fields"*, Image Processing Theory, Tools and Applications, IEEE 2010.

[22] http://www.ideeinc.com/products/tineye

[23]http://www.tineye.com/faq#what%20TinEye%20article%20on%20ars%20technica

[24] http://www.websitedescription.com/gazopa.com.