Image Retrieval-Current Techniques and Open Issues: A Survey

Nikita Patel
Birla Vishvakarma Mahavidyalaya

Abstract

In this article current image retrieval techniques Keyword Based, Semantic Based, Text based and Content Based techniques of image retrieval is presented. It's a computer structure for searching, retrieving and browsing images from digital images database. It also describes issues related with Gap between features, Retrieval speed, interactive systems and so far.

Key Words: *Content based image retrieval, annotation, Text retrieval, Semantic*

I. INTRODUCTION

Image retrieval is a major field of research in image processing and area of computer vision. In initial decades image retrieval structures search images based on keywords. Most outdated and communal methods of image retrieval utilize metadata such as captioning, keywords or explanations to the images. So that retrieval can be performed over the footnote words. Retrieval systems searches for the images by keyword found in text. Text based image retrieval systems (TBIRs) requires manual explanation of images in prior. As, footnote of images are a very tedious task which requires a lots of time and frequently produces misleading results. To overcome this limitation of TBIR, visual content of the images is employed to search the image. System utilize this concept for searching, navigating and browsing images from large image databases which is termed as Content Based Image Retrieval (CBIR) system. CBIR system is more successful. It's close to human perception. It search similar images based on visual content of a given query as well images.

II. TECHNIQUES

Keyword Based Image Retrieval

The Keyword based image retrieval used keywords as descriptors to index an image. Before images are being stored in the database, they are examined manually and assigned keywords that are most appropriate to describe their content. These keywords are stored as part of the attributes associated to the image. During query stage the image retrieval system will accept from the user one or many keywords. A keyword matching process is then performed to retrieve images associated with the keyword that match the search criteria.

Semantic Based Image Retrieval

High level images couldn't captured by combining single or multiple features. Retrieval of image is not satisfactory by capturing only low level features. So semantic gap comes into picture. For image representation content which contains semantic terms allows text query to users for accessing images that are more intuitive. Here the image extraction process will extract the low level features of images either by textures, spatial, color and shape. These features can be clustered based on the similar characteristics of the visual features to form some regions representation and next to form objects representation in the images. This annotation process can be done either, semi-automatically, manually or automatically.

Text-Based Image Retrieval

Illustration of images like large volumes of databases valid for one language with image retrieval. Text based retrieval is concerned with with several language, so there is the need of language independent retrieval. Problem of human perception is subjective. There is also the problem of deeper (abstract) needs. Queries that cannot be described at all, but tap into the visual features of images. The previous work by the researchers of image retrieval, images was manually annotated. It was costly; this was affordable for only large organizations.

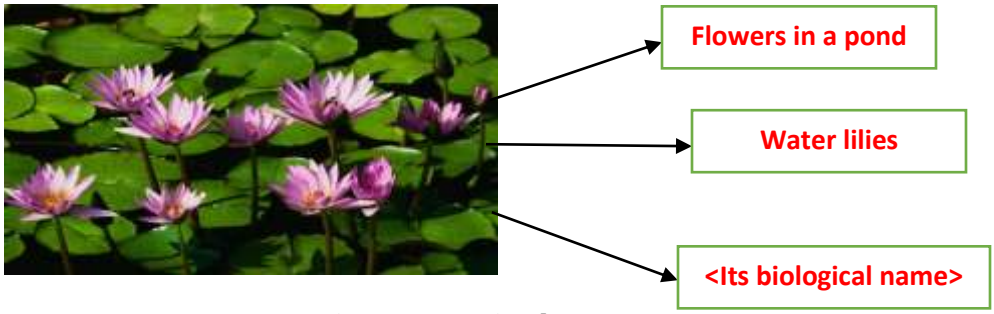


Fig: 1 Text retrieval

Limitations of text-based approach

- Image annotation
  - Large capacities of databases
  - Valid only for one language
- Human perception
  - Biasing in human perception
  - Too much accountability on the end-user
- Deeper (abstract) needs
  - Queries that cannot be described at all, but tap into the visual features of images.

Content Based Image Retrieval

Content-based image retrieval (CBIR) has been used as an alternative to text based image retrieval. CBIR is any technology that in principle helps to organize digital image archives by their visual content. The most common form of CBIR is an image search based on visual. Conventional databases allow for textual searches on Meta data only. CBIR is a technique which uses visual contents, called features. In form of a query image to search images from large scale image databases based on users' requests.

CBIR enhance accuracy of the information which is returned and complement to traditional text-based image searching. For describing image texture, content, shape and color features used. Color is most extensively used low-level visual features and is invariant to image size and its orientation. There are color histogram, color moments as conventional color features used in CBIR. Many objects of an image can distinguished without other information only by textures, many objects in an image can be distinguished solely by their textures. Structural arrangement and their relationship of regions describe the texture, it also consist some basic primitives. Shape feature extensively used for retrieval systems.

Feature Extraction

Query image feature values are compared with other images in directory and similar image is extracted. Image is quantized in HSV color space into equal bins and the features extracted from HSV color. Filter are used to remove noise from image where, image is given as an input to the application, system find its nearest neighbor from the training set and system fetches nearest image to the input test image. System sort images according to smallest distance form which user select an image and system will extract image based on query image features and will display similar image to user. This can be work only with any jpg images and fetch only one image at a time. System fetch similar images which has similar query image feature value.

Primitive features of feature extraction are:

a) Mean color (RGB)

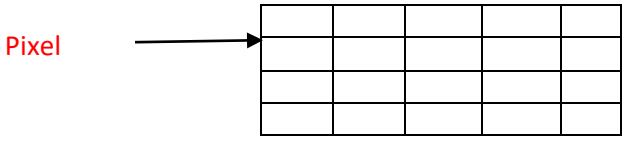
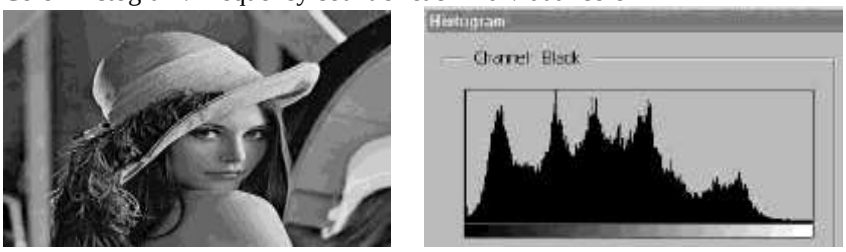


Fig: 2 RGB Pixel representation

Mean=Sum of that component for all pixels /Number of pixels

b) Color Histogram: Frequency count of each individual color



(a) (b)

Fig: 3 (a) Image (b) Equivalent Histogram

Semantic features are:

a) Color Layout, texture so far...

Domain specific features are:

a) Face recognition, fingerprint matching etc…

Multidimensional indexing

Mean Color = RGB = 3 dimensional vector, Color Histogram = 256 dimensions, Effective storage and speedy retrieval needed, Traditional data-structures not sufficient, R-trees, SR-Trees etc…

Image Representation

(b) Image Similarity Characterization
(c) Machine Learning for Image Annotation
(d) Image Indexing and Database Organization
(e) Query Formulation
(f) Query Result Display and Assessment
(g) Users' Feedbacks & Updating

Open Issues are:

Gap between low level features and high-level concepts.

Human in the loop – interactive systems

Retrieval speed – most research prototypes can handle only a few thousand images.

A reliable test-bed and its measurement criterion

If image segmentation or object detection is performed, how to represent or model image structure? What are the roles of image structures on image understanding?

If image segmentation or object detection is not performed, how to represent the local information at the object level? If SIFT features are used for object characterization, how to deal with noise and different types of objects?

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