# Image and Annotation Retrieval via Image Contents and Tags

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*Abstract:* **There are many search engines that uses tags and keywords for Image retrieval. Tags are primarily a precise and brief description of an image. Tag-based image retrieval increase the performance of retrieving images with help of low level feature image database. In this paper, we describe combination of tags and low level features like color, shape & texture. Low level feature extraction of color, shape and texture, we used HSV color model, Sobel with mean and median filter, Framelet texture respectively.For the accurate image search and retrieval manual tags must be better, but previous work shows that the manual tagging to the images are inconsistent and inefficient to finding appropriate image. Missing and ambiguous tags decreases the accuracy of TBIR, so to recover that problem, we include completion of tags to image database. The objective is to automatically fill in the missing tags and correct noisy tags for given images. Basically features are computed using thesethree methods and then they are combined for similarity matching using hybrid graph between images in the database and query image. The system is able to retrieve the images related to the query as well as annotating the query image.**

*Keywords:* **Content-based image retrieval, image annotation, image similarity graph, image-tag bipartite graph, text-based image retrieval.**

## I.INTRODUCTION

In recent years content based image retrieval has received significant attention. In this paper two level data fusions are used to retrieve the image and annotate the query image based on image contents and tags:

1) A unified graph is built to fuse the visual feature-based image similarity graph with the image tag bipartite graph.

2) A cbir along with tbir is used to utilize a fusion parameter to balance the influence between the image contents and tags.

Another approach to the semantic gap issue is to take advantage of the advance in computer vision domain, which is closely related to object recognition and image analysis. Duygulu*et al.*[2] present a machine translation model which maps the keyword annotation onto the discrete vocabulary of clustered image segmentations. Moreover, Blei and Jordan extend this approach through employing a mixture of latent factors to generate keywords and blob features. Jeon *et al.* [13] reformulate the problem as cross-lingual information retrieval, and propose a cross-media relevance model to the image annotation task. In most recent, bag-of-words representation [9] of the local feature descriptors demonstrated promising performance in calculating the image similarity. To deal with the high-dimensionality of the vector feature space, the efficient hashing index methods have been investigated in [1] and [2]. These approaches did not take consideration of the tag information which is very important for the image retrieval task. Most recently, Jing and Baluja [13] present an intuitive graph model-based method for product image search.

However, the image-tag [11] and video-view graphs [11] based approaches did not take consideration of the contents of images or videos, which lose the opportunity to retrieve more accurate results. In [13], a re-ranking scheme is developed using similarity matching over the video story graph. Multiple-instance learning can also take advantage of the graph-based representation [13] in the image annotation task. In [3], the images are represented by the attributed relational graphs, in which each node in the graph represents an image region and each edge represents a relation between two regions.

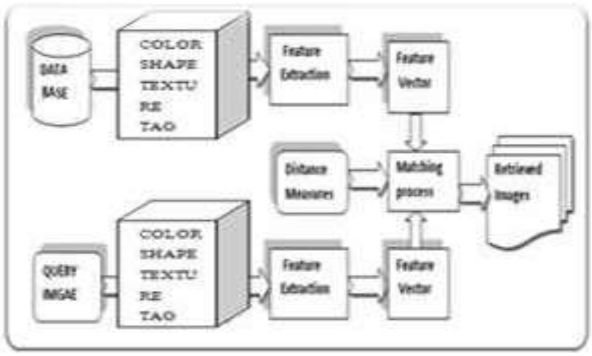


**Fig1.General System architecture design**

In general, content based image retrieval provides user interface for communicating with the user. User selects the required information as-wel-as query image and retrieves results to him. Images are matched on the basis of low-level visual features, the similar images are retrieved.

In this paper automated image annotation technique is used to make huge unlabeled digital image index by existing text based indexing and search solutions. Our database consists of ten folders of various types of 1000 images. Each folder consists of a particular set of similar 100 images, e.g. roses, horses, airplanes, fishes etc. We are assigning common tags to only one image in a data set. Then with the help of similarity matching function, the other images in the same set will be annotated automatically. The database is dynamic, i.e., could be updated at runtime.

## II.FEATURE EXTRACTION

### A. Color Feature Extraction Methods

**1)Grid Color Image :** It extract the color features of the image, in the traditional way theyuses the RGB, as compared to RGB, HSV has betterperformance, so we use HSV for the Grid Color moment feature extraction[4].

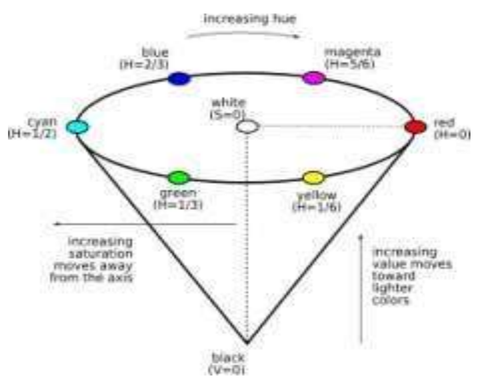


**Fig 2. HSV color model**

We propose the scheme to produce 15 non-uniform colors by using the formula that transfers from RGB to HSV is as given below:

H= $\cos^{-1}$ { ½[(R-G) + (R − B)]/$\sqrt{(R-G)2 + (R-B)(G-B)}$}

S = 1 −3/R + G + B[min(R,G,B)]

V=1/3(R + G + B)

The R, G, B represent red, green and blue components respectively with value between 0-255. In order to obtain the value of H from 0 to 360, the value of S and V from 0 to1, we do execute the following formula:

H= ((H/255*360) mod 360

V= V/255

S= S/255

The steps to retrieve color images are as follows:

Step 1: Accept an image from the available dataset.
Step 2: Resize the image for m [256 X 256].
Step 3: Convert the RGB color space image to HSV by using above given formula.
Step 4: Generate the color histogram of hue, saturation and value.
Step 5: Quantize the values generated into number of bins.
Step6: Store the quantized values of database images into a file.
Step 7: Load the Query image given by the user.
Step 8: Apply the procedure 2-6 to find quantized HSV values of Query image.
Step 9: Sort the distance values to perform indexing.
Step 10: Display the retrieved results on the user interface.

### B. Shape Feature Extraction

**1. Sobel with Mean and Median Filter:**

| Method | Advantages | Disadvantages |
|---|---|---|
| Sobel, Prewitt | Detection of edges and Their Orientation | Inaccurate |
| Laplacian Of Guassian | Finding the Correct Places Of the Edges | Corners and curves where the gray Level intensity function varies |
| Canny | Using probability for finding error rate | Complex Computations and False Zero Crossing |

To overcome this limitation of sobel, we used mean or median filter with sobel method to de-noising the noise effect. So we can tackle this problem of noising with the help of mean and median result, to get better results.

So, in summary, the three steps are:

1) Compute the image storing partial derivatives in x (Dx (x, y)) by applying the left 3 × 3 kernel to the original input image.
2) Compute the image storing partial derivatives in y (Dy (x, y)) by applying the left 3 × 3 kernel to the original input image.
3) Compute the gradient magnitude S(x, y) based on Dx and Dy.
4)

Two further things to notice about Sobel filters: (a) both the derivative kernels depicted above are separable, so they could be split into disjoint x and y passes, and (b) the entire filter can actually be implemented in a single-pass GLSL filter in a relatively straightforward manner.

### C. Texture Feature Extraction

**1. The Proposed Algorithm Using Framelet Transform:**

The basic steps involved in the proposed CBIR systemas follows [12].

1) Feature vector ( ) Decompose each image in Framelet Transform Domain.
2)Calculate the Energy, mean and standard deviation of the Framelet transform Decomposed image.

Mean value of the h Framelet transform sub band co-efficient of h
Frame let transform sub band. × is the size of the decomposed sub band.
3)The resulting = [ 1, 2, …., , 1, 2…… ] is used to create the feature
database.
4)Apply the query image and calculate the feature vector as given in step (2)
& (3).

5) Calculate the similarity measure.

6) Retrieve all relevant images to query image.

**D. Image Annotation**

Automated image annotation has been an active and challenging research topic in computer vision and pattern recognition for years. Automated image annotation is essential to make huge unlabeled digital photos indexable by existing text based indexing and search solutions. In general, an image annotation task consists to assign a set of semantic tags or labels to a novel image based on some models learned from certain training data. In addition to the success in image retrieval, our framework also provides a natural, effective, and efficient solution for automated image annotation tasks. For every new image, we first extract a feature vector through the method described above in Section III-A,B,C.

**E. Similarity Matching:** For every set of similar images in the database, only single imagesare be assigned tags. The remaining images of the set are be annotated automatically using similarity matching method. Thus, we don't have to manually assign tags to every image.

*Image with Tag:*It is build to utilize a fusion parameter to balance the influence between theimage contents and tags and finally retrieve the images rank wise as well as retrieve the annotations for the query image.

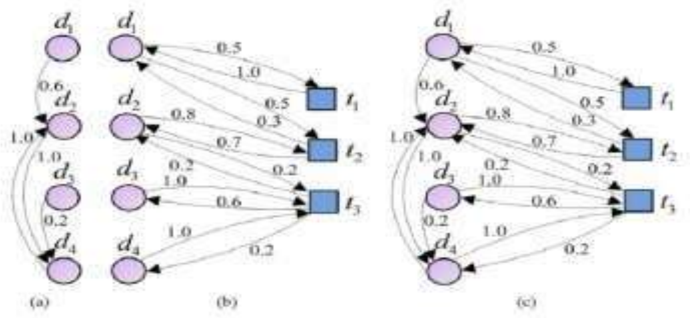


**Fig 3.Hybrid graph**

**PRECISION** = Number of Relevant images retrieved /Total Number of images retrieved.

**RECALL**= Number of Relevant images Retrieved/Number of relevant images in thedatabase.

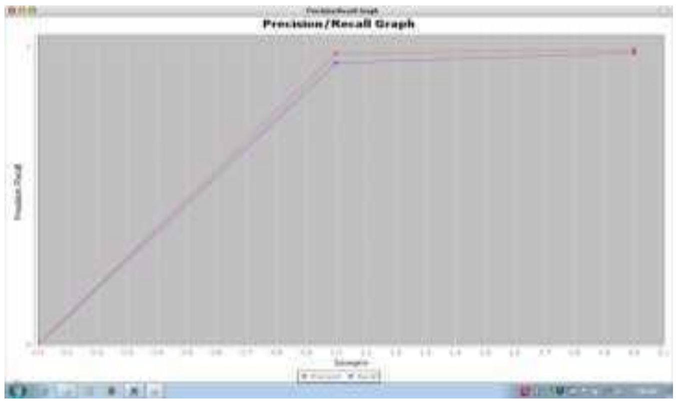


**Fig 4. Precision Recall graph**

## IV. IMPLEMENTATION RESULT


**Fig.5 Search By HSV Method for color Feature**

 


**Fig 6.Search by Modified Sobel and HSV for Shape and Color Feature**

**TABLE I**
**ANALYTICAL TABLE**

| Feature Extraction Method | No. of images | Color (HSV)% | | Shape (Sobel with mean and median filter)% | | Texture (Framelet) % | | Color+Shape (HSV+Modifiedsobel)% | | Color+Shape+Texture( HSV+Modified sobel +Framelet)% | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Images** | | **Pr** | **Re** | **Pr** | **Re** | **Pr** | **Re** | **Pr** | **Re** | **Pr** | **Re** |
| **Horse** | **90** | 94.12 | 93.79 | 98.506 | 98.32 | 87.90 | 86.11 | 97.85 | 96.87 | **99.28** | **98.50** |
| **Rose** | **100** | 96.35 | 95.71 | 99.54 | 98.26 | 89.340 | 88.82 | 99.95 | 99.94 | **99.19** | **98.00** |
| **Aeroplane** | **100** | 93.70 | 92.17 | 94.23 | 93.69 | 88.60 | 87.45 | 96.13 | 95.45 | **98.33** | **97.21** |
| **Bortratz** | **108(108*8)** | 100 | 95.481 | 88.27 | 87.32 | 100 | 95.58 | 91.12 | 90.23 | **95.23** | **94.09** |
| **Fish** | **70** | 93.80 | 92.36 | 85.56 | 84.29 | 86.56 | 85.44 | 95.54 | 94.68 | **97.86** | **96.92** |
| **Apple** | **100** | 91.60 | 90.491 | 87.24 | 86.55 | 87.65 | 85.96 | 91.25 | 91.05 | **96.98** | **94.90** |
| **TOTAL** | **1324** | 94.928 | 93.33 | 92.22 | 91.405 | 90.00 | 88.22 | 95.306 | 94.703 | **97.81** | **96.60** |

Pr=Precesion Re=Recall

From the above table we can see that for every individual method , the results are average. Whereas for combination of all the three methods, namely, HSV, Sobel with mean and median filter and Framelet respectively, the results are much better and accurate. Thus, the overall efficiency of the system can be justified.

## V.CONCLUSION

In this paper has presented a novel framework for one thousand image retrieval tasks. The proposed frameworks retrieve images with their annotation. Our method can be easily adapted to very large datasets. For every set of similar images in the database, only single images are be assigned tags. The remaining images of the set are be annotated automatically using similarity matching method. Here in this paper various low level visual features techniques are discussed with their issues and advantages.This helps to increase performance and retrieval efficiency and thus decreases time complexity.

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