Implementation of Enhanced Image Re-ranking using Query Specific Signature

Miss G. M. Sewani¹ Mr. P. B. Mahadik²
¹M.E. Student, Department of computer science, DIEMS, Aurangabad, India.
²Lecturer in Department of computer science, DIEMS, Aurangabad, India.

Abstract: With the uninterrupted growth of image search engine with re-ranking, to get exact outcome in very less time has become very energetic and challenging research theme. The existing search engines are mainly based on text information, which cannot satisfy the needs of users. Due to very rapidly growth in technology, so how to understand the web image re-ranking algorithm based on content using the text-based information became an urgent request.

Image search re-ranking belongs to the category of techniques that are refers to rearrange the image search result returned by the text based search engine. The rearrangement or refinement aims at a new result list that has better overall importance to the query than the original one. Since, the information extracted from the visual content of the initially returned images is use effectively to derive the re-ranking result better, image search re-ranking is also often referred to as visual (image search) re-ranking.

Keywords: Image search, visual query, query expansion, query categorization.

I. INTRODUCTION

Image searching is considered as an invention of images either from database or any other sources. Consider we have n images, retrieved from primary search engine such as Google, yahoo, etc. The re-ranking process is used to recover the search accuracy. Re-ranking defined as reordering the images based on the given information extracted from the primary search engine.

To perform searching, a user has to type query in text form including keywords, image name, image category, etc. After that user get result on the basis of text that result contains 2 or 3 images of same name of different people. After that select one image as a input from text based result. Finally user find all relevant and exact images of that input image. Basically system performs comparison and similarity by checking some themes like image intensity, image pixel, image color, file name, region detection, face, number of object present in image etc...

There are two standard popular image retrieval methods available are -
1) Text based Image Retrieval (TBIR).
2) Content based Image Retrieval (CBIR).

Challenge in existing image re-ranking:

1. Without online training, the similarities of low-level visual features may not well compare with images high-level semantic meanings which interpret users search intention.
2. Some popular visual features are in high dimensions and efficiency is not satisfactory if they are directly matched.

Objectives:

- Improving the result of web search engines for better image quality retrieval.
- Identify user intention and responds the system with advanced quality images.
- Avoid the duplication and re-rank the images result set.
- Making it data-driven, so that maximum images can be processed using the system.
- Generating efficient and exact output that keeps user satisfactory with system.

II. METHODS

System consists of mainly two modules:

1. User
2. Admin

Some algorithms are used for retrieving relevant and exact image pattern from enter keywords.
2.1 Algorithm 1: k-NN (k-Nearest Neighbor) Supervised Learning

Given training data D = {(x1, y1), (xN, yN)} and a test point where N is the input/output pairs and where x_i - input and y_i - output/label.

x_i is a vector consisting of D features. Also called attributes or dimensions. Features can be discrete or continuous. x_i_m denotes the m-th feature of x_i.

1. For given Training set: (x1,y1), (x2,y2), …, (xN, yN)
2. Assume x_i=(x_i(1), x_i(2), ………, x_i(d)) is a d-dimensional vector for i.
3. Find k closest training points to x_new with respective to Euclidean distance.
4. Classify by y_knn = majority vote among the k points.

2.2 Algorithm 2: Porter Stemmer

The Porter stemming algorithm or Porter stemmer is a process for removing the common and inflexional endings from words in English. Its main use is as part of a term normalization process that is usually done when setting up Information Retrieval systems.

2.3 Algorithm 3: Stop Words

Stop words are words which are filtered out before or after processing of natural language data as well as it also refer to the most common words in a language. For some search engines, there are some common words such as the, is, at, which, and on. Sometimes stop words can create problems when searching for phrases that include them. So, in enhanced search engine, we removed such most common words to improve the performance.

System Architecture Diagram:

According to below figure 1, there are 2 modules, First we did gathered requirement for the application. Then we studied the previous system and found the limitations of the previous system. To overcome the limitations we are going to build this application. We have divided the application into two parts namely the user and the admin.

Fig 1: System Architecture Diagram.

System Implementation Flow:

The user will type text query keyword ‘saniya’. So set of similar images will retrieve according to text-based search i.e., “saniya nehwal” and “saniya mirza”. Then user has to select next image to capture his intention. So user select “saniya mirza”. Next query image will categorized internally with predefined categories set by system. Next keyword expansion will take place, words will suggested by system, they will automatically get expand to text query and again searching will perform. Image pool expansion is perform on images got from text-based search and after keyword expansion process will merge together. Next clustering will perform according to candidate keyword present in all images retrieved by first two steps, here all images of “saniya mirza” comes as output. Next detection of duplicate images will perform. The efficient flow of the one click user intention image search System is shown as follows.
**System flow Description**

1. **Image search:**
   
   In this step, it retrieves images from the database by text query. Large training image set is maintained to check the similarity of set of images. Algorithm checks it and forms cluster, so basically normal search of image is done. Similar images will be retrieved. This step is not so effective for searching.

2. **Query categorization:**
   
   In this step, image similarity is defined. Query image has assigned set of category and according to this category training image set also categorized images store in database. Some set of predefined properties like: General Object, Scenery Images, Portrait, and People. When query image gets as input to system that image is gets categorize in above mentioned properties. At initial stage we are using 1000 manually labeled images, 10 for each category, to train a C4.5 decision tree for query categorization.

3. **Visual query expansion:**
   
   This step is mainly used to expand image criteria by considering visual features. We will combine here visual and texture features so that system can be obtained multiple positive images. Suppose for example, we have text query as “apple”, so query image is an ‘apple fruit’ so system will automatically capture the similarity between apple and another images containing apple in that image. e.g images containing tree with apple. And there are many irrelevant images among the top-ranked images. This is because the visual similarity metric learned from one query example image is not robust enough. By adding more positive examples to learn a more robust similarity metric, such irrelevant images can be filtered out. We aim at developing an image re-ranking method which only requires one-click on the query image and thus positive examples have to be obtained automatically.

4. **Image retrieved by expanded keywords:**
   
   In this step, considering efficiency of image search engines, such as Bing image search, only re-rank the top N images of the text-based image search result. If the query keywords fail to capture user’s search intention accurately, then there will be small number of similar images will be in result and more number of negative images will also be there. So this problem is solved in proposed system.

5. **Detection and removal of duplication:**
   
   In this step, we have removed the duplicate entries. While searching images there are multiple number of images with same name so we are searching with category for exact result.

**III. RESULTS**

System has mainly two modules, one is admin and other one is user. Admin has authority to upload the new images in database, manage database, and control on image search concept.

![Upload Image](http://www.ijettjournal.org)
1. Normal search
2. Category search
3. Image filter search

In this module user also get recommendation result as well as online information of enter keywords. In normal search, first user enter text keyword such as “actor”, after 4 images of same image name will comes and choose one image from that like “amir”. Finally all images of “amir” is comes as output from database. With this, recommendation result will also comes and it show there are some more images of another actors in database.

Fig 4: Normal search.

In category search, user search images by category (image name, image category). For example, user enter “rose” of category “flower”. Finally all images of “rose” is comes as output from database. With this, it also shows recommendation result.

In filter search, user extends it’s search criteria like advanced search with parameters are color, image extension, image name etc. In this stop words algorithm is used for removing some common English words.

Fig 5: Output page of “Amir” keyword.

In result, we have to check the performance of our system compare to existing system with respective to advantages and disadvantages.

**Advantages:**
- The main advantage of the system is that it exactly captures the user intention and retrieves the relevant images.
- Cost of the system is less and more flexible.
- No other training or guidance required for the using of the system.
- System is satisfied the user, no extra input overhead is required to the user.
- There are some features like duplication detection and category wise search who gives exact match.

**Disadvantages**
- The main and biggest drawback of system is we have limited set of data and query set. So if database regarding user query at run time doesn’t match then system will show no images found massage.
- Performance of the system is based on the database size.
- System may take some more time to check the visual similarity of query image and dataset also to store all the RGB values if we expand database.
- To add the extra features like crawling and inter-connecting with audio/visual then cost is so high.

**IV. DISCUSSION**

The discussion should be considered as the heart of the paper and how the answers fit in with existing knowledge on the topic. Compared to existing system, our approach is much more efficient because the main computational cost of enhanced image re-ranking is less on comparing visual features and the lengths of semantic signatures are much shorter. And it gives accurate and relevant result of text. Our result show the recommendation result and online information of enter keywords, which is my own contribution in this research project. And final result will shows on the basis of comparing pixel of image with respective intensity in histogram with other
images in database. In this experiment, we have taken image set of 10 images of each category, so database contain 1000 images. In future we can add resolution and select that output image as whatsapp or facebook profile.

![Histogram of select text image (i.e., “amir”).](image)

Fig 6: Histogram of select text image (i.e., “amir”).

Above Figure show histogram of “amir” text which is used for comparing select image of amir with database other images. From histogram final output will comes.

V. CONCLUSION

It is easy to retrieve similar images based on text based query and content based retrieval system. But it sometimes fails to capture user intention exactly. In enhanced image re-ranking search engine it is done by asking user to click on one image so system can capture its exact intention. Thus the overall efficiency is 85% by using this process compared to other approaches of image searching. Enhanced image search result is completely satisfactory result for user, it’s easy to access and retrieve quality images faster. It is efficient all steps are done automatically in system without asking any overhead to user like asking him some more details about exact match, or letting him fill form to get more information.

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