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Review

An Intelligent On-line System for Content Based Image Retrieval

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ABSTRACT

This study builds on our previous work and proposes an intelligent content-based picture retrieval system [1]. The foundation of the system is our neuro-fuzzy method, which is detailed in [1]. For example, you may enter "mostly red & many blue & few green" into the CBIR system online, and it will return photos with their secret values as an output. The system learns the meaning of mainly red, many red, and few red using a neural network, and it employs fuzzy logic to understand many natural phrases like mostly, many, and few. The C programming language and CGI scripts were used to implement the system on the World Wide Web. We have shown some first findings with a single query in [1]. Expanding our online system to handle numerous requests, such "many blue and few green," is the focus of this research. Our online system was used to perform many experiments, the results of which are presented and discussed in this study.

INTRODUCTION

Huge picture collections are mushrooming at a dizzying rate, thanks to the proliferation of inexpensive storage devices and lightning-fast computer and communication technology. Research on picture content retrieval from diverse and extensive datasets is both crucial and difficult. Quite a few systems have been created so far. Image features including color, texture, and form are extracted by these systems. It is common practice to extract these information from photos and store them in databases [3]. In terms of visual identification and discrimination, color is among the most important aspects. "Imprecision," "partial information," and "user preferences" are characteristics that are intrinsic to content-based picture retrieval systems [4, 5].

AA user may ask the system to find photographs in the database that contain a mix of blue sky and green grass by selecting colors from a palette and then asking for those images. You may do the same thing with the image's texture or form [6, 7]. The incomplete and inaccurate inquiry is this one. From the perspective of the user, the provided color palette signifies the portion of the user's information need. Looking at it through the lens of the database, the query lacks precision. In order to get the pictures, the user may ask for them by choosing between two color preferences: green (0.8 preference) and blue (0.4 preference) [8, 9]. Images with seemingly random shapes may be located and identified using the color extraction technique. Colors that are part of certain color sets constructed from color palette [10]. The database index looks for a color set and is constructed directly from picture color extraction. Users are able to identify a limited palette of hues, according to experiments [11]. Therefore, the prototype can only differentiate between nine hues, in accordance with the human perceptual range.

Our online technology is smart and can retrieve images depending on their content. You will find this expanded approach to be both efficient and easy to use. The CGI script is used to build the system. Following is the outline of the paper. Part 2 explains the neuro-fuzzy content-based image retrieval method; Part 3 discusses the intelligent online CBIR system; Section 4 presents the experimental data; and Section 5 gives the conclusion.

2. Neuro-Fuzzy Content Based Image Retrieval Technique

The two-step process of neuro-fuzzy content-based picture retrieval is detailed in this section.

Step one: Figure 1 shows how the database query is built using natural language phrases like "mainly content," "many content," and "few content of some specific color" to get photographs. The question is defined using fuzzy logic. Nine hues that are perceptible to the human eye are defined here. Rep (color)= {red, green, blue, white, black, yellow, orange, pink, purple} is the set of colors used to

show features. The neural network takes these nine colors as input and returns the content type as output. Most of the time, the output is presented as many or few.

The second stage is shown in Figure 2, which provides an overview of our neuro-fuzzy content-based picture retrieval system. A database of photos is created by downloading various images from the World Wide Web (WWW). The process involves extracting and storing picture features including color, texture, and form in a database. For illustration purposes, let FS stand for the collection of all picture attributes; for instance, Fs = {color, texture, shape}. In our first prototype implementation, Fs = {color}, we just use the color capability. Thinking about trying out other shapes and textures will be something to think about later on. To represent the collection of feature values that a user may identify, we utilize Fu. Research by Carson and Ogle [7] identifies nine hues that fit inside the range of human vision, which prompted our feature representation set. The Berkeley Digital Library Project's (http://elib.cs.berkely.edu/src/cypress/meets.c) tool is used to extract the color feature from the photos. The feature database is a separate database that stores these colors.

Most, many, and few are examples of natural language inquiries that users like to submit. It follows that we will use "mostly," "many," and "few" as our assumptions for the specific color content of each picture. A fuzzy set [0, 1] serves as the interpretation domain in our model. The numbers used for "mostly" vary from [0.9, 1], "many" from [0.4, 0.5], and "few" from [0.15, 0.25]. Additionally, numerical weights like 0.9 and 0.92 are so near to one another that they both show that the targeted photos primarily have the given attribute. As a set, the nine colors make up Fu. Each picture has a certain amount of pixels, denoted as Np. Nf, where f □ Fu, is the number of pixels that correspond to each color value (red, green, blue, etc.). The confidential factor for each picture for the specified query is calculated using the output produced after training the neural network.

3. Intelligent On-line CBIR System

Using the methods covered so far, we can build an intelligent online system capable of handling many questions. Figure 3 shows the system's overview. Two parameters—content (mainly, many, or few) and color (red, green, etc.)—make up the online graphical user interface that accepts input. Following careful analysis of all inputs, the system retrieves pertinent photographs from the database or the web and, one by one, produces the secret values for each image. The picture that has the greatest values is the one that best fits the question. The photos are shown in decreasing order based on the confidential values.

On input query of "Mostly Red & Many Green" the search will be performed in following way: First all images with "Mostly Red" query will be searched, the next search, i.e. "Many Green" will follow on the images found by previous query.

4. Experimental Results

The efficiency of the system was evaluated by the execution of the specified number of trials. The World Wide Web (WWW) picture collection served as our database. We entered these pictures into our database. Images like "Mostly Green and Few Yellow" may be retrieved from the database by selecting the two colors sequentially from the color palette. Similarly, tabular form is used to identify content types like Mostly and Few. Instead of providing numerical values like 50% or 70%, the inquiry is worded in natural language. In Figure 4, you can see the query's result with the colors and content categories that were defined. All of the acquired photos, tagged with an image number and a secret factor. Images mostly depicting flowers with golden centers and verdant foliage. There is an abundance of greenery and very little yellow. Figure 4 shows that out of all the photos in our database, Image #72 has the highest confidential factor of 0.992769 because it has a nice mix of predominantly green and few yellow. The confidentiality factor is used to acquire all additional photos in decreasing order.

See figure 5 for the outcomes of the "Mostly Red and Few Green" inquiry. There are a maximum of two colors in these images: red and green. After obtaining photographs with a high concentration of red hues, we refine our search to those with a lower concentration of green hues. With a value of 0.994928, picture #10 has the highest confidential factor. In decreasing sequence, all of the photos are acquired with their confidential factor. As an example, we have also tested several color schemes and content genres. "There are no images for the specific query." is the message that the user sees if the image database does not have any images matching their particular query.

5. Conclusion

Users of online picture databases may benefit greatly from a content-based query tool that is based on several color and content searches. We have upgraded our system to accommodate picture searches with many queries. The user may choose from a variety of content kinds and colors in the system. The results of our several studies validate the system's viability for online image processing over the Internet. When it comes to color and content type, only one neural network is used for query training. We want to expand our image processing capabilities in the future to include form and texture.

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