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EFFICIENT IMAGE RETRIEVAL USING COLOR AND TEXTURE FEATURES

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ABSTRACT: The CBIR approach is used to extract a picture from a big database. The color, texture, and form of an image are its most important components. The suggested method effectively extracts images by removing their attributes. Dominant color features allow predominant colors to be extracted to help with picture indexing. The Gray Level Co-occurrence Matrix (GLCM) is one method for characterizing the texture of images. Texture and color are not characteristics that set one apart. Shape information can be seen in edge images produced with gradient vector flow fields. Combining shape, texture, and color information results in a comprehensive set of attributes for image retrieval. The weighted Euclidean distance of shape, texture, and color can be used to distinguish between different kinds of photos. This retrieval approach uses a support vector machine to determine the significance of an image. This method will display images that are fairly similar to the one you requested.

Keywords: CBIR, Dominant color descriptor, GLCM, GVF, SVM.

1. INTRODUCTION

Users are able to access a large library of photos using image features with Content-Based Image Retrieval (CBIR). Image retrieval systems used image-based search methods rather than text-based search strategies because photographs needed indexing. Efficiently removing images from massive files is a problem that needs fixing. Using image retrieval algorithms, similar photos in a collection can be located. Retrieving images based on their content is an alternate method to searching for images using words. Color, texture, and shape have been used by individuals to describe the image's contents. Color is one of the most prevalent low-level visual qualities; it does not vary as a function of size or orientation. CBIR makes extensive use of color histograms, correlograms, and DCDs. Texture, dominating color, and shape all play important roles in content-based picture retrieval. The way buildings blend in with their environments is a reflection of the place's character. It is equally important to think about the basics. We used the Gray Level Co-occurrence Matrix (GLCM) to get texture properties. Retrieval systems often make use of shape. The CBIR methodology used a gradient vector flow field, a gray-level co-occurrence matrix, and prevailing tints to characterize the concrete's color, structure, and shape. The CBIR system followed these procedures to find the right pictures in a big collection:

- To determine the images people want and how they go about finding them.
- To accurately capture edge images by using invariant moments to detect their color, texture, and geometry.
- To determine which picture captions work best.

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- To extract these properties from unprocessed photos.
- To know there are a lot of pictures, but not enough space to keep them all.
- To understand the way that research and archived images reflect people's views on related matters.
- To use the information linked with the photos to quickly find them in storage.
- Such that CBIR tools can have functioning interfaces built.
- To sort the parts of a query picture according to their texture, shape, and color, Support Vector Machines (SVM) are used. In the end, a photo database query is executed. Accuracy and error rate are evaluated. You can get your photographs faster using this method.

2. LITERATURE SURVEY

In order to find relevant patterns and correlations in previously collected image data, R. Durga Prasad created an image mining technique. For maximum efficiency, he organized the photos in a specific way and found the shortest path between them. Color, texture, and geometric shapes were the focal points of Nilima R. Kharsan's artwork. Impressive picture retrieval skills were shown by the method. The target and query photos are very similar in terms of texture and color. It was found that the way photos were retrieved was affected by feature distances and visual feature vector annotations. T
hey state that in order to make interpretation easier, the visual feature vector is dimensionality reduced before indexing. Visuals were developed by Zhijie Zhao by combining shape, color, and texture. Even though their method increased accuracy rates in simulations, the few visual components aren't enough to capture the complexities of the query images. Search results for web photos could be rearranged, according to Sonali Mathur's proposal. Use a graph-based algorithm that takes different learning preferences into consideration to rearrange internet photos. The data includes pictures from many different types of categories, thus the algorithm may utilize a variety of techniques to find similar images. You have a lot of options, including bar charts, color meaning interpretations, color scheme descriptions, effects, and more. Anil T. Lohar proved that pictures can reveal details like shape, color, texture, and more. CBIR is used to extract pictures from data. The CBIR procedure is divided into three separate phases:

- Image Acquisition
- Feature Extraction
- Similarity Matching.

A variety of options are at your disposal for acquiring images. The majority of systems rely on written instructions and documents. Photographs were scaled by Neelima Bagri based on their regions of interest to speed up the image retrieval procedure. Removing complicated backgrounds from photos is a breeze in Photoshop. To retrieve media files like movies and photos, a powerful functionality is required. Tamura used statistical measurements to extract statistical features, and they found an efficient way to figure out how an image is oriented. They achieved a better outcome after using Tamura and shape feature vectors after texture and shape were excluded. As to S. Sasikala's claims, Content-Based picture Retrieval (CBIR) can search picture databases for patterns that look similar to current images. In order to retrieve images from a large image database, the Content-Based Image Retrieval (CBIR)

method incorporates computer vision algorithms. It does this via making use of visual information that is based on content or by using querying images themselves.

Research on image retrieval systems has been stoked by content-based image retrieval, claims Aboli W. Hole. In the beginning, when photos needed to be identified and categorized, word searches were used for image collection. In order to complete his project, M. BabuRao must employ text-based search techniques and manually identify photographs. Nothing came of these plans. CBIR was tasked with independently analyzing photos and extracting geometric, color, and texture properties. To improve data administration, image files should have metadata. Based on MPEG-7 technology, this system used Content-Based Image Retrieval (CBIR). At first, the query image—which does not include any further information—has its low-level properties extracted. The next step is to find CBIR images that have the same basic characteristics. To recover images, Wang et al. (X-Y) used color and texture attributes.

With fewer feature vector dimensions to work with, the suggested method improves accuracy and memory economy. Trademark Image Retrieval is abbreviated as TIR. To aid the trademark registration system in handling the large amount of trademark images, FAN-HUI Kong created it. After the edges were detected by the Canny edge detector, the global and local features were extracted using form correction. It was thought that the field will eventually shift toward study that was more focused on specific subjects and had real-world applications. The main color description was developed by MPEG-7. Chun, the adolescent, obtained the images in this way.

An effective content-based image retrieval system, according to the author, requires color and texture information across several resolutions. Using texture features in query-by-example picture retrieval is demonstrated in detail. Features such as shape, texture, and color have been included in visual descriptions. One of the most common basic visual aspects that did not change no matter the size or orientation of the image was color.

In CBIR, the main color features were the color histogram, color correlogram, and dominant color descriptor. Prior to the invention of spatial representation, the most popular way to display colors was via a color spectrum. Color correlograms show the likelihood of recognizing color pairs at a specific pixel distance using spatial information. Color correlograms are superior to color histograms when it comes to recovery. The spatial correlations between identical hues are the only ones shown by color autocorrelograms.

Finding images became more easier with its faster computation execution compared to a color correlogram. The design's texture was also crucial. A surface's responsiveness and interaction with its environment is what this term refers to. When looking at a photograph, you can tell different items apart just by looking at their textures. An environment's texture can reveal information about the structure's organization and how it interacts with its surroundings. This analysis focused on the textural features extracted from the Gray-Level Co-occurrence Matrix (GLCM). Retrieval systems often make use of shape. While form features rely on global invariant moments, shape signatures are obtained from distorted images.

Improved methods for extracting form, color, and texture attributes are required by KattaSugamya in order to increase system reliability by growing database groups. In order to find images that were similar to the query image, a support vector machine (SVM) was used

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to scan a huge database. Support vector machines (SVMs) sorted the important photos from the unimportant ones. It provided extensive data on precision and memorization. To remove texture components, Savita used the GLCM grid. They extracted characteristics using a color histogram, SVM, Gabor filter, and wavelet features.

3. CONTENT BASED IMAGE RETRIEVAL

Query by Image Content (QBIC), also known as content-based image search, makes it easier to organize digital photos based on how they look. The idea came from looking through huge collections of images using computer vision technologies. Claims-Based Image Retrieval, or CBSR, is a way to find pictures in a collection that match a certain query picture. For more information, we looked at the picture's main color, structure, and shape from different angles. This made both the search results and the descriptions of the images better. This method uses the main color, texture, and shape of a picture.

Extraction of dominant color of an image

The idea of color space has nothing to do with DCD extraction. The RGB color standard is used to make sure that everything is the same and to help people understand. There are eight separate groups in the RGB color space. The viewer thinks that all the colors in a segmented block are the same. Once the main division is set, the quantized color for each part is chosen from the middle of that segment. In eye perception, a dominant color zone is a group of pixels that all have the same color. This is what happens when people think. By looking closely at a picture, you can find places where there is a lot of color data. Keeping the difference between main locations and attributes can make it easier to find similar photos in the database.

Extraction of texture of an image

Images are made with texture rendering based on GLCM. Matrix statistics can be used to get information about texture properties. In texture research, the GLCM method is often used. A grayscale spatial dependency matrix is made up of pixel values. The GLCM functions look at picture patterns by measuring how often certain values and places are correlated with certain pixels. To find statistical factors, Gray Level Co-occurrence Matrices (GLCMs) were made. The GLCM is used to find statistical measures like energy, association, uniformity, and contrast.

Extraction of shape of an image

Using the grayscale edges, data is taken from each database picture. Gradient vector flow (GVF) fields were used to make the edge picture. Gradient vector flow (GVF) is an outside force that is always present in the active contour method.

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4. CONTENT BASED IMAGE RETRIEVAL SYSTEM USING SVM

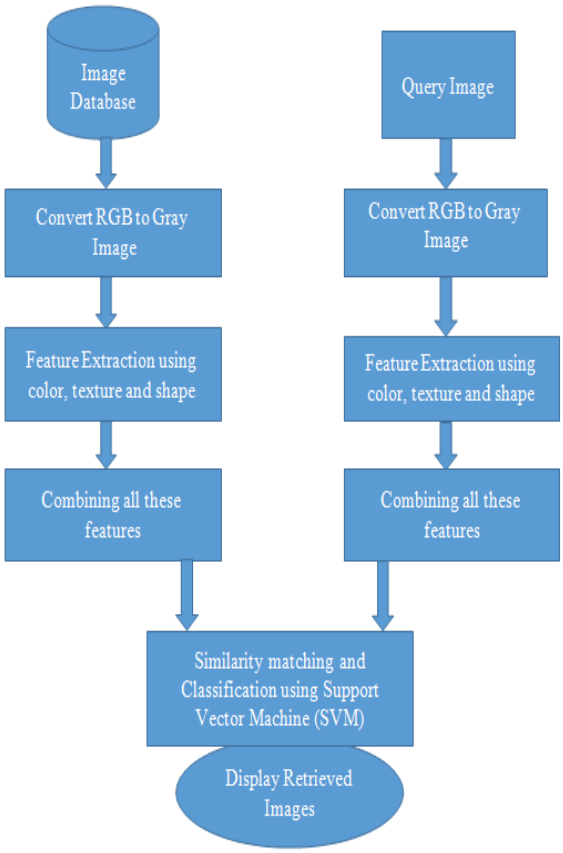

Fig.1Support Vector Machine-based CBIR block model

Figure 1 shows a block design for support vector machines (SVM)-based content-based picture search. For this method, pictures are chosen from a large collection. We started by using a "query" picture to find images that were relevant. Putting the Gabor filter on the picture in question makes a grayscale version of it. After that, the image's structure, color, and shape were brought back to life. One way to figure out what a picture's main color is by looking at its dominant color description. Gradient Vector Flow (GVF) and Gray Level Co-occurrence Matrix (GLCM) show how a picture is shaped and how it feels. It shows how the pictures in the library are different in terms of color, shape, and texture. During the similarity matching process, images in a database are turned into grayscale and their characteristics are pulled out. Support vector machines divide images into two groups: those that are important and those that are not. The feature vector dataset of the query picture is compared with the feature image repository to show the images.

5. SUPPORT VECTOR MACHINE

Support Vector Machines find a hyperplane in an N-dimensional space (where N is the number of features) that clearly divides data points.

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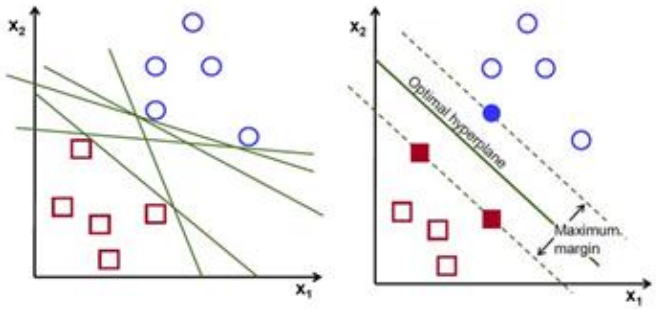

Fig.2Possible outcomes

A method in the field of guided machine learning. Support Vector Machines (SVMs) are good at solving problems with regression or classification. Despite this, most of its ideas are important to everyone. Using the support vector machine (SVM) method, each data point was placed in an n-dimensional space. Here, n is the number of features and the location value is the aspect ratio. After that, we found the hyperplane that separates the two groups for classification purposes. Support vectors are numbers that are used for a single measurement. The SVM method is very good at telling the difference between linear and hyperplane groups.

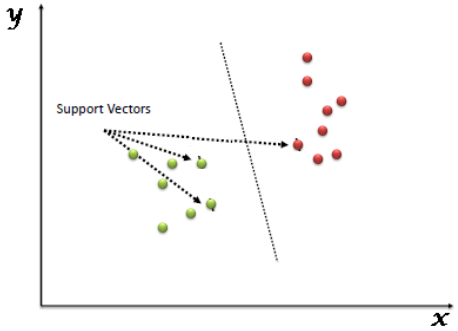

Fig.3.SVM'shyper-plane

CBIR found the best way to arrange texture, color, and shape. The pictures were taken from the library. Feature extraction is used to get the color, texture, and shape of the finished picture. Having these traits makes it much easier to remember things and keep what you've learned. The Support Vector Machine (SVM) sorts query pictures into groups based on things like texture, shape, and color. After this, a visual database query is run. Based on our research, SVM was the most accurate and trustworthy method. To get color information from pictures, the researchers will use color moments, color auto-correlograms, and HSV histograms. This method uses extracted feature vectors to find an image database with a picture as an input. The HSV histograms of the photos were used with the Quadratic Distance Equation to make this comparison. The application uses texture-based search to make it easier to find colors. The Euclidean distance method was used to figure out what the texture was like. Using a support vector machine (SVM) classifier can improve accuracy and make an image confusion matrix that shows what the picture is about.

6. CONCLUSION

The feature set sorts each picture in the database into a group based on its color, texture, and shape. The shape, texture, and color traits were found using a CBIR method. GLCM, GVF, and the Dominant Color Descriptor can all be used to get features. The pictures of the query

and the database match up. Support vector machine classifiers can find important pictures in huge sets of pictures. Even though CBIR works, SVM can make better pictures.

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