Automating Image Retrieval using UIpath(RPA) by Extricating Color Feature with String comparison in CBIR

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Abstract- Pictures convey much more information than the words could. CBIR technology ventures into various fields with many applications, substantially with large database. This technology uses visual features to organize digital pictures. Image retrieval problems in large database are based on the applications of computer vision techniques. Images can be indexed using color, shape, texture or any other information which could be derived from the image. Initially, UIpath studio authentication is done. Further, a Bot is created to load the file. Once after this process is completed we need to load the input image. Once this is done the control is transferred for image classification. The images in the datasets are classified first using support vector machine classifier, and efficiently represented. This fundamentally helps in efficiently extracting the images. The color feature is extracted based on color string coding. Then, we compare one string with another string and finally, their matching weights are returned. As the process is automated using RPA technology, there will be a message box prompted to the user asking whether to continue the detection process for another input or whether to quit. This subsequently ensures that the similar images will have exorbitant matching weight and lower distance. The system uses image database that consists of 200 images from Corel dataset. This CBIR technique improves perfection of images that has significantly increased the accuracy while retrieving images that is appropriate to the given input image.

Keywords – ***Content Based Image Retrieval (CBIR); Database; support vector machine; color string coding; color string comparision;Robotic Process Automation(RPA)***

I. INTRODUCTION

Pictures convey much more information than the words could. The multimedia data is growing rapidly, searching an image or retrieving an appropriate image from an archive is quite stimulating research problem. The visual cues found in the images are exploited for representing and retrieving the images. Image retrieval framework can be categorized as: text based and Content based. Manual annotation by text descriptors for the image is the venture in a text based systems. The flaws of text based approach were conquered by CBIR.

Rather doing manual annotation we can automatically index images by visualizing their valued features such as color, texture, and shape or any other information that can be derived from the image. In CBIR, images that is stored in the database has its features extricated and is being stored. Then we compute the features associated with the query image. Finally we retrieve images with closest feature. The color feature is extracted and compared using color string coding to the features of the query image. As the extraction of features and matching of high dimensional data is very time consuming, this becomes the downside of CBIR. This process is automated using RPA for handling repetitive task exactly in the same way as that of human and thus eliminates human intervention.

II. EXISTING SYSTEM

Various research are being carried out and extents of numerous methods have been proposed to extricate the features of image from enormous database and image retrievals used the content from an individual image.

Chiunhsiun Lin and Ching-Hung [2] developed a video frames retrieval scheme for efficiently retrieving video frames. Each video frame is being transferred to a color string using straightforward rules. Subsequently, images are being compared using the color strings. This mechanism was very successful in conveying the video frames retrieval problem to strings comparison. This decreased the computational complexity. The system favors both the content based video frames retrieval system (similarity-based retrieval) and a text based video frames retrieval system (very rapid and mature).

Lakshmi A. et al. [3] uses a technique which shows a better retrieval. This technique interprets using the global distribution of local feature which ideally describe the local visual characteristics around salient or invariant points. This feature exhibits the global nature of the image alone. The method associates the global texture (Curve let) and color feature with local features which is being derived from the striking feature.

S. Nandagopalan, *et.al* [4] proposed a peculiar technique for generalizing image retrieval based on semantic contents. The system built had grouping of color, texture, and edge histogram descriptor. A novel idea using greedy strategy is being substantiated for extraction of images. By doing so it reduced the computational intricacy.

V.N.Gudivada and V.V.Raghavan [5] uses huge number of profoundly selective features and methodical learning of queries for image retrieval. The approach is persuaded on the assumption that by using a sparse set of visual “causes” each image is getting generated and that images that share “causes” are visually similar.

Irtaza and Jaffar [6] showed the effectiveness of the proposed model. The Corel dataset image gallery is cleaved into two parts: Corel X having 1000 images that are divided into ten categories and Corel Y that has 9900 images. The mean precision and recall rate which is procured by this proposed method had top 20 retrievals and is observed with other standards of retrieval systems.
Returned images of varied numbers are being used to view the retrieval capacity of SVM and this showed a persistent results. Thus, the outcome obtained from this model has improved results and is more reconcilable in image retrieval.

Manno et al. [8] proposed sketch-based image retrieval (SBIR) system is being enforced on real-life images. The image countenance is used to control image descriptors and fetching results.

P. Mack et al. [9] work utilizes a multi-page hashing scheme for searching images from the enormous database they use. The technique uses Fourier descriptors for representing an object. This is used as an input to hashing scheme. For decreasing the search time, Binary search tree is being used. The methodology used here allows image extraction using lambda search or on object textures.

A. Douik et al. [10] gleaned from the Upper-Lower of Local Binary Pattern (UL-LBP) is dependent on the Local Binary Pattern (LBP) . The overall image is being described using the global features .

N. Angelescu et al. [12] proposed SQL based CBIR. It enhanced the query process on CBIR system. This is written in SQL programming language and it provides us a portable solution. The system is tested on infantile hemangioma images.

III. PROPOSED SYSTEM

The proposed system consists of the folllowing steps as shown in the Fig. 1

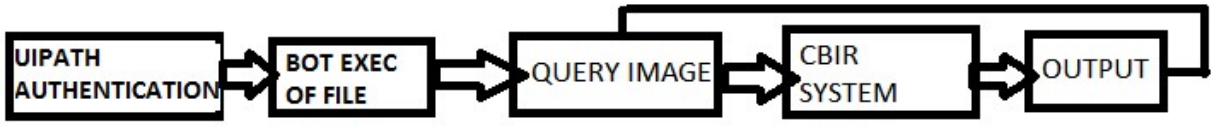


Fig. 1: Basic Flow Diagram

- Obtain UIpath authentication
- BOT execution of file
- Take the image from the user as an input query.
- Perfom the cbir system functions.
- Image Retrieved based upon the given input query.
- RPA repeats the process for requesting again the next input query.

The below Fig. 2 represents the Proposed System Architecture.

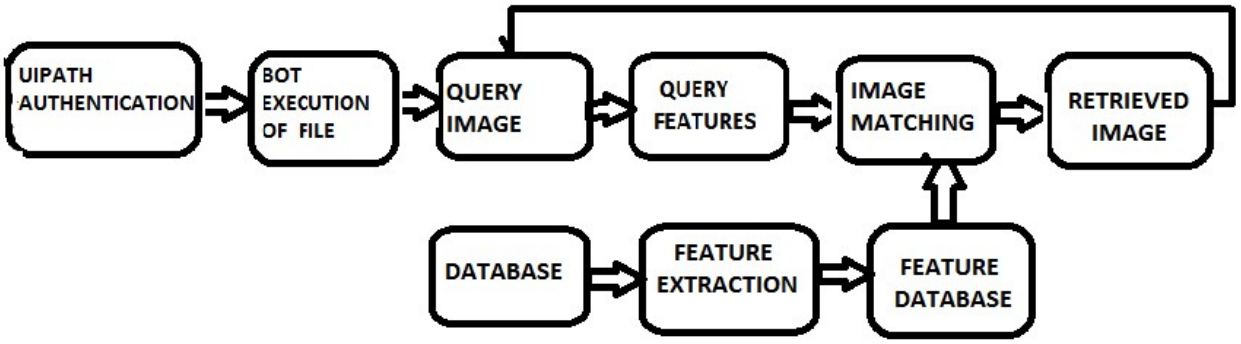


Fig 2. Proposed System Architecture

3.1. Query image

This is the input query which is given by the user to CBIR system. The are 4 types of query they are – query by keyword, query by image, query by sketch, query by concept layout.we use query by image in our system.

3.2. The Database Classification

With leading edge, there is an increase in the usage of digital cameras, smartphone, and Internet.The shared and stored multimedia data has a substantial growth and it's become a challenging task for either search or to extract a relevant image from an annals. Comparing every input query is time consuming and tideous work.Support vector machine(SVM) classifies the massive amount of database into a unique class labels.

i) Support vector machine

A support vector machine (**SVM**) [1] is a learning model which comes under supervised learning, uses classification algorithms for classifying the given dataset into two-group classification problems. So the main belief of SVM is used to contrive a hyper plane as the decision surface .So this eventually creates a margin that separates given example into two different classes. SVM provides solution for both classification and regression issues.

3.3. Feature database

It is the database that consists of all the information related to the image such as shape, size, texture, time of capture etc.

3.4. Feature Extraction

The process of extricating required quality and characteristic in a given image is called feature extraction. Subsequently, for performing classification features from the image are initially extracted. This feature will be further used inside a classification model. Thus this system uses the color string coding and comparison for potent CBIR system. We extract the features for input image and all other images existing in the database.

Color string coding

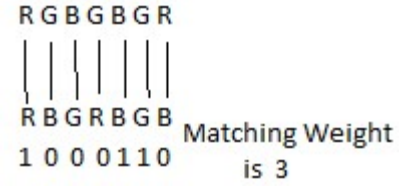
Firstly, the original image have to be resized into 20*20 pixels to decrease the effects of variations, because each image may be of different size. Herein, all frames are resized by bicubic interpolation technique [7]. This technique interpolates data points on a two-dimensional regular grid. We use the RGB color model since it is 3 dimensional vector space. This model got its name from the initials of three primary colors Red, Blue, Green. The RGB components are 3dim vector space R,G,B. these are different from the modified condition. After the transfer, each frame will become a 2D string array, and later this will be converted to a string.

There are 6 rules that govern to transfer each frame to a color string as follow:

Rule 1:if a pixel (R>G) && (G>B) is then assigned pixel as R.

Rule 2:if a pixel (R>B) && (B>G) G is then assigned pixel as S(almost Red).
Rule 3:if a pixel (G>R) && and (R>B) then assign pixel as G4. Feature Extraction
Rule 4: if a pixel (G>=B) && (B>=R) then assign pixel as H(almost Green).
Rule 5: if a pixel (B>=R) && (R>=G) then assign pixel as B.
Rule 6: if a pixel (B>=G) && (G>=R) then assign pixel as C(almost Blue).

Color Strings Comparison
After RGB value vector for the target and query image is being found the system further substantially starts comparing the query image color string and target image color string and return the matching weight. This value is the resultant of this system. Hence for the query we compare one character of query string with that of the target string situated at the same position .If characters on both the place are same only then the matching weight will be set to 1 else 0.Consider the following example



Similarity measure
We classify the database using support vector machine (SVM) [1].After classification the database get a unique class labels for the related images. The caption of the input image is compared with that of each class label in the enormous database.
This eventually helps us to identify whether the input image belongs to distinct class label or not. Once after it is determined that the input image belongs to a particular class label, we further can access only those images from the database that satisfies the matching criteria. Using our defined methodology, compare the input image with all images that is selected in the particular database. Based upon matching score weight extract the related images from enormous database.

3.5. Image Matching
The processed queries are then matched with the features of the stored data to yield a result. This will be retrieving image relevant to that of query image. It is the retrieved output for the query information given by the user.

IV. EXPERIMENT AND RESULT

The database used for our system consists of 200 images from various categories. The aim of this technique is to measure the retrieval effectiveness by database classification. Precision and recall are the performance metrics used to evaluate this techniques performance.

$$\text{Precision} = \frac{\text{True Positive}}{\text{True Positive+False Positive}}$$

$$\text{Recall} = \frac{\text{True Positive}}{\text{True Positive + False Negative}}$$

The simplicity of this technique ensures that the measures can be interpreted. Not only that these measures can also be visualized via graphical representation. This gives us an easier way for analysis..
These metrics provides simplicity in performing estimations and effortless interpretation of results. Apart from that, the results obtained from these metrics can be provided using exploratory analysis paving way for easier analysis.
The process of extricating required quality and characteristic in a given image is called feature extraction. Subsequently, for performing classification features from the image are initially extracted. This feature will be further used inside a classification model. Thus this system uses the color string coding and comparison for potent CBIR system. We extract the features for input image and all other images existing in the database.

$$\text{PRECISION RATE} = \frac{\text{NUMBER OF RELEVANT IMAGES RETRIEVED}}{\text{TOTAL NUMBER OF IMAGES RETRIEVED}}$$

$$\text{RECALL RATE} = \frac{\text{NUMBER OF RELEVANT IMAGES RETRIEVED}}{\text{TOTAL NUMBER OF EXISTING RELEVANT IMAGES}}$$

The below Fig a. represents UIpath Authentication.

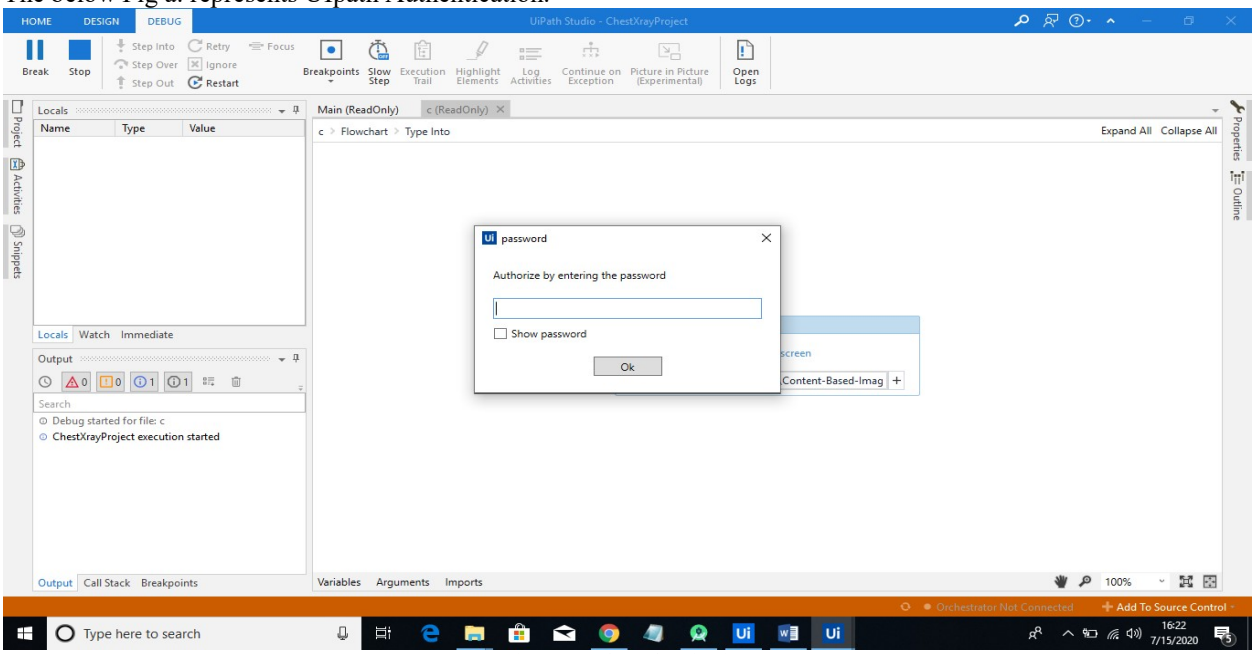


Fig. a UIpath Authentication

Once authenticated, the URL for Anaconda Navigator gets invoked and then file gets loaded .Further there is a request for input image. The below Fig. b & Fig. c depicts this.

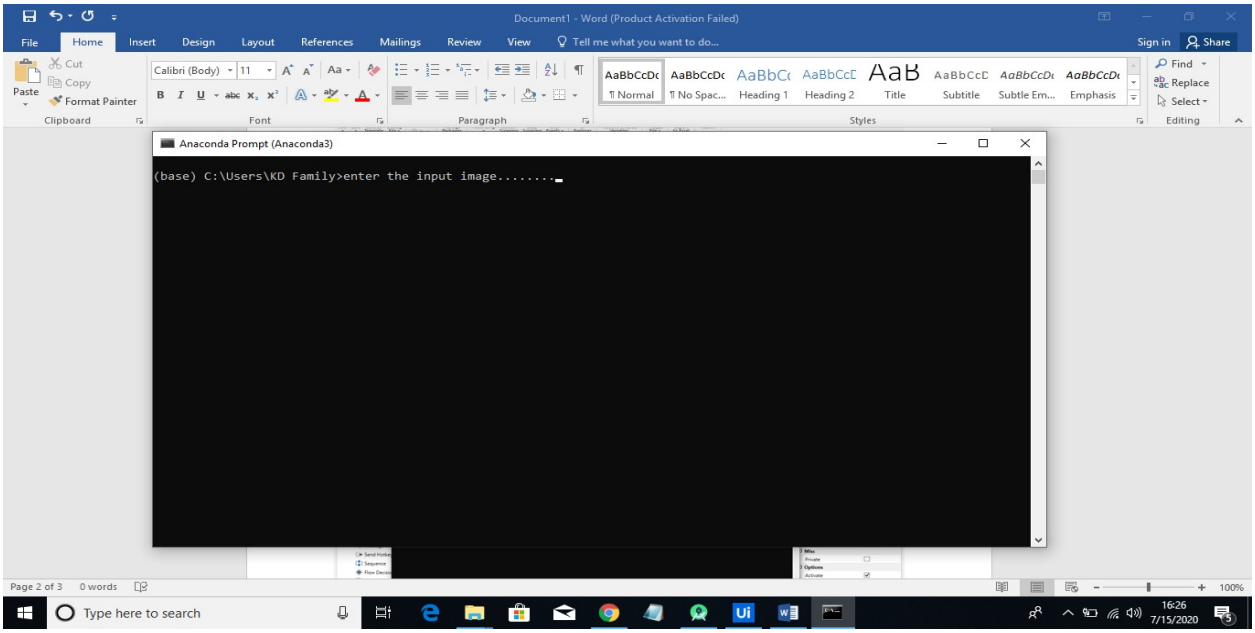


Fig. b Prompt for input image

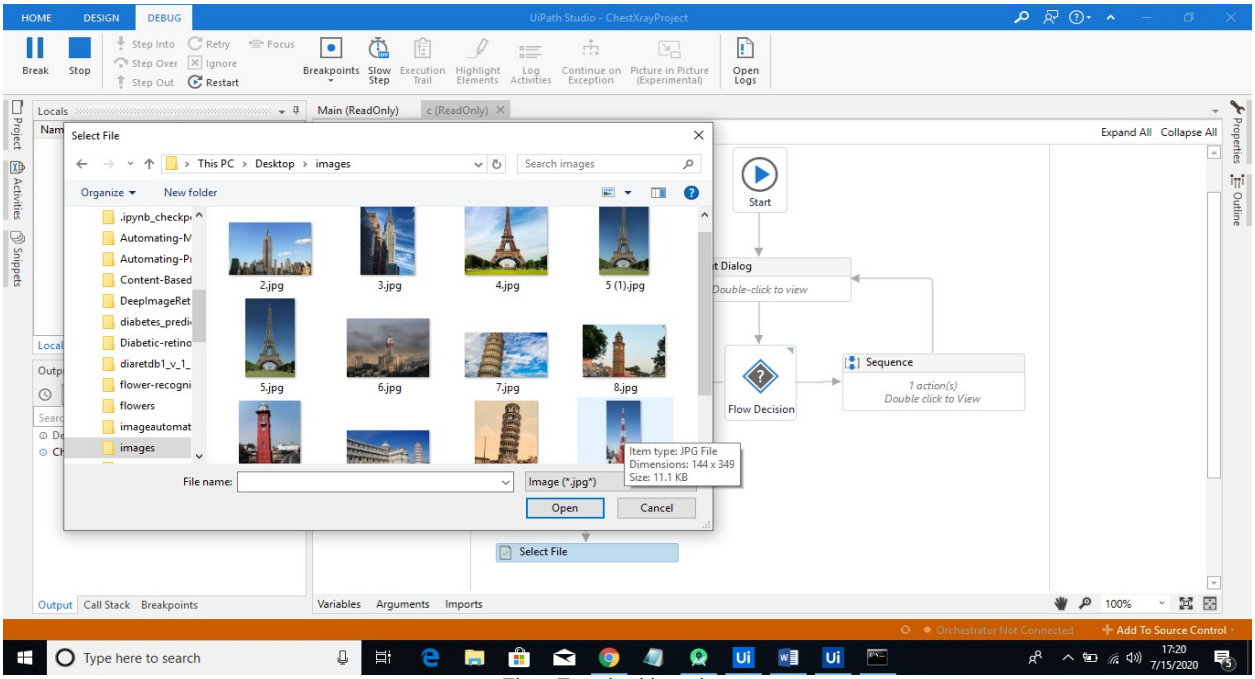


Fig. c To upload input image

Fig. c represents the input query image specified by the user. After this the feature of the query image is extracted and the color string comparison takes place. Further the features that is matched with the query image and the images stored in the dataset are retrieved. Fig. d represents the extracted images and the total number of extracted images as a final output.

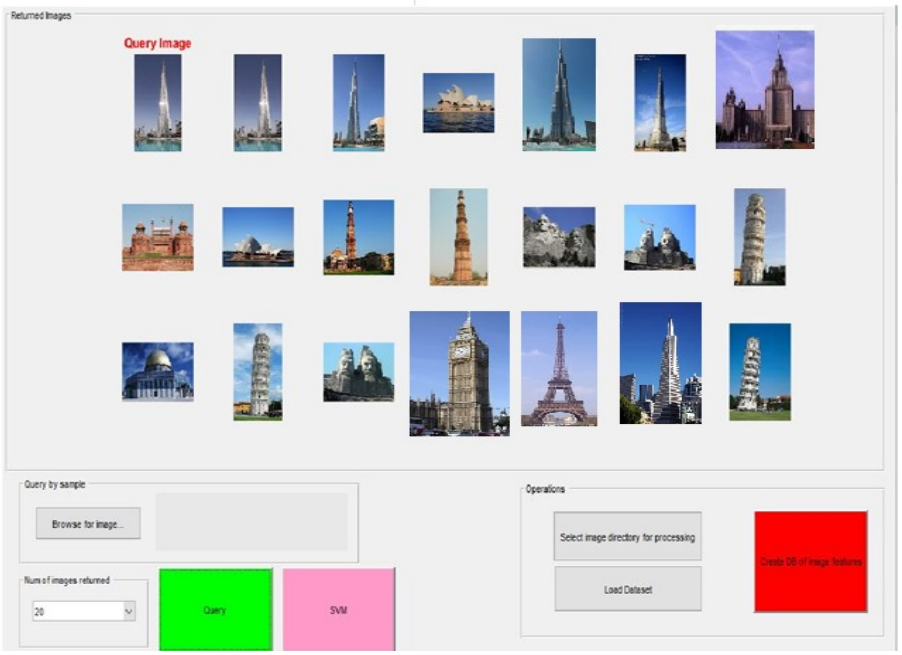


Fig. d Retrieved Images

V. CONCLUSION

Thus a venture into the system of image retrieval by first classifying the database using Support Vector Machine (SVM) then extricating the features using color string coding and comparison. It is a methodical process for obtaining images from huge database based on the color feature and the complete process is automated. Using database classification we can get better results and augment the performance of the CBIR. This model gives us a precision of 80 percent. In future, our proposed work could further be enhanced to not only extract color feature of images relevant only to RGB values, but other than RGB values also.

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