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CONTENT BASED IMAGE CLASSIFICATION

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Abstract - *Multimedia content analysis has become an essential part of the real world and digital images is an influential part of this world. The complexity of the world is increasing at a great pace especially the images, which are increasing exponentially More than a million of images are uploaded a different social media platforms on a daily basis. Searching a specific kind of image from the chronicles has been troublesome so In order to solve this problem, CBIC has come into vision. CBIC has become very crucial in order to retrieve millions of images uploaded everyday. In CBIC images are grouped categorically and images are retrieved from this large database on the basis of their visual content. For example-Games images can be classified hierarchically as indoor and outdoor images at the highest level and outdoor images further be classified as badminton images, cricket etc. Indoor images can be further classified as ludo, chess etc. The performance of Content-Based Image Classification system depends on efficient feature extraction and correct retrieval of similar images. The essential concepts and studies related to image classification and image representation are elaborated, and further research directions are also mentioned to inspire further studies in this area.*

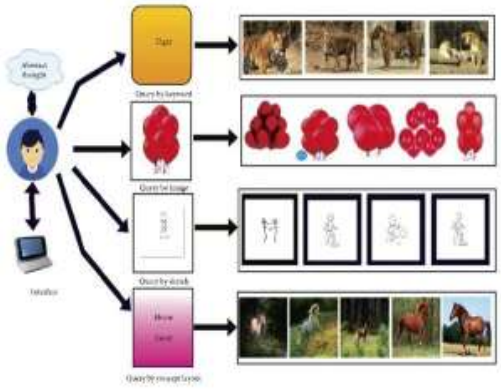

Fig 1.1(Different concepts of image retrieval)

1. INTRODUCTION

First off, let us begin by understanding what is image classification, then we will understand what is content based image classifier. As the name suggests, image classification is the process of classifying multiple images into various categories on the basis of their similarities. For example, there are two images showing two different motor bikes, made by two different makers but they both are similar in the way that they both will be classified under the same category as they are both images of bikes.

Image classification is very crucial as everything is digitalized these days and to deal with such a huge amount of data we need softwares dedicated solely to this purpose. Content based image classification is one of the methods for the same, in this we classify images on the basis of their content, and the classifier recognizes the objects present in the image and then classifies them. CBIR along with classification, also helps us to retrieve relevant image(s) from the database, for particular query image(s). It extracts features like shape, colour, texture etc from the objects present in the input image and uses them as a source of classification.

Now, let's take a quick peek into it's working: The input image is represented with the help of color histogram feature where the HSV space is chosen. Each H (Hue), S (Saturation) and V (Value) component is uniformly quantized into 8, 2 and 2 bins.

Before the seventies, RGB color model was used but then graphic design researchers created HSV space in order to have a model that resembles the perception of the human eye. HSV is a cylindrical geometry with the Hue as their angular dimension. Red is at 0° passing through the green primary at 120° the blue primary at 240° and merging black to red at 360° The neutral or gray colors represent the vertical axis with a range starting at Value = 0 representing black at the bottom to Value = 1 representing white at the top

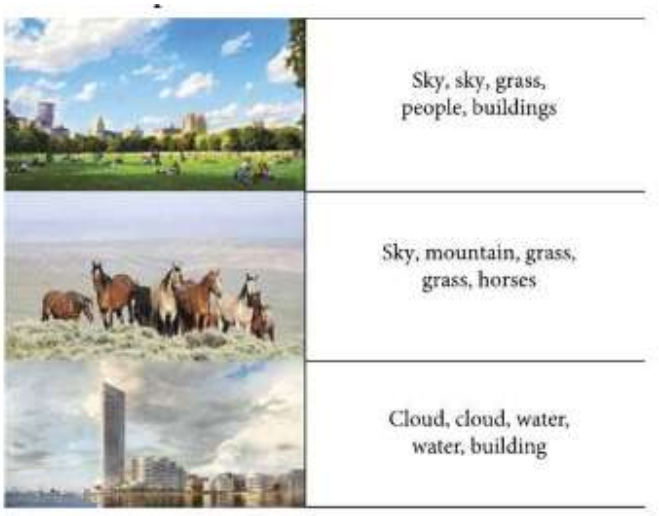

Fig 1.2(Example of image annotation)

2. LITERATURE REVIEW

Existing systems for content based image classifier:-

1."Zhao F,Huang Y,Wang L,Tan T" proposed a method for multi-image retrieval in which a deep convolutional network is merged with hash functions for performing hash codes mappings.

2. "Lin et al." proposed a method for creating binary codes using CNN for retrieval of large scale images.

3."Shuijn Zhu And H.R. Tizhoosh" proposed Medical image retrieval through SVN.

4.CBIR technique using color and texture information was proposed by "Xiang-Yang Wang,et.al". In this the image is altered from RGB space to adversary chromaticity space.The text attributes were extracted using a rotation-invariant by using Zernike chromaticity.

5."G.Pass et.al. proposed a method for spatial features .The model is not variant to scaling, rotation and shifting.

6."Guo et al." proposed a CBIR using ODBTC features for constructing attributes of image such as BPF and CCF. Bit pattern features are characterized by edge, shape and content of image.

7."Yamamoto" proposed a CBIR which uses multiple histograms for taking into account spatial information of colors.

3.LANGUAGE TO IMPLEMENT

The following languages and technologies are used in our project 1)Python 2) Machine Learning 3)Deep Neural Network

3.1 Python

Python is a simple, efficient and flexible programming language. It is an object-oriented language that provides efficiency to read the code in a simple way. It integrates the system more efficiently. Python was created by Guido Van Rossum in 1991 and it has 2 versions python 2 and python 3. Python can be used for building an efficient content based image classification as python contain a wide range of libraries such as matplotlib. pyplot which is a collection of command style functions that make matplotlib to work as MATLAB. Each pypolt function makes changes to figure like creating a figure or plotting lines etc. Also numpy can be used for adding a support for building multi dimensional image and matrices.

3.2 Machine Learning

Machine Learning is a technique to learn from examples and experience without programming it explicitly it is a type of artificial intelligence that focuses on creating computer programs that change accordingly when exposed to new data. There are various libraries in machine learning which include Matplotlib, Numpy, Panda, etc. The python libraries matplotlib is used in our project. It is a very known library for recognizing the data. It visualizes the patterns in the data. It includes different types of charts and graphs in it such as the histogram bar chart etc. Machine learning can be used for content based image classification as machine learning can specify classes or category of query. Various machine learning algorithms can be used for building training and test models and can be used for increasing the efficiency and performance of the classifier. The algorithms are used as they provide an accuracy by which we can specify whether a model is efficient or how much accurate it is i.e. whether it is capable of correctly classifying images in a dataset into categories.

3.3 Deep Neural network

Deep Neural network is an artificial neural network with more than 2 layers, it uses mathematical ways to process the data. The phrase 'Deep Learning' is associated with deep neural network because deep learning uses the concept of artificial intelligence for classification is used in various application such as computer vision and in fields like robotics.

4. SCOPE

Content based image classification researches are favorable but in the future, there is remarkable scope for research. In the future, this system is also implemented in the field of computer vision which deals with automated processing of images from the real world. It can also be used in scientific technology such as astronomy for the study of celestial bodies such as commits, planets, etc. In future, the time for classification and retrieval can also be reduced. In future this technique can be improved by using spatial information and the concept of deep learning.

Deep neural network is a network having three or more than three layers of non-linear information stages. DNN consists of (i)training a deep learning model from a large collection of training data;(ii) applying the trained deep model for learning feature representations of CBIR.

5. CONCLUSION

The problems of image retrieval organization as well as the percentage of similarity between images has been examined earlier in the paper, hence the used strategy to acquire these two tasks are discussed in our algorithm.In multimedia retrieval, target images that are present in the database are ranked by providing an appropriate score returned to the user. This appropriate score is determined by the choice of similarities. The chosen approach was the distance measurement in this approach; the image has been shown as a mixed sized vector and the relevance of content is measured on the basis of the normalized distance between

the vector of aggravating features. The task of development, implementation, and use of various algorithms has resulted in a classifier.

Z[l]=W[l]+A[l-1]+B[l] (Formula used)

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