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A review on Deep Learning for content-based image retrieval

Nikhil Nandkishor Kela
kelanikhil1995@gmail.com
Sanmati Engineering College , Washim , Maharashtra

S. R. Tayde
sapnatayde@rediffmail.com
Sanmati Engineering College , Washim , Maharashtra

ABSTRACT

Content based image retrieval system has a crucial parameter as effective feature and similarity measures. Amy researcher work very hard to find out the solution for effective retrieval and still the work is continuing. The main objective is to remove the semantic gap exist between low level and high level real time pixel value. Machine learning became an outstanding solution to cope up with this problem and various success ratio has been achieved through it. And that can be achieved by implementing by various technical and representation features with it to improve the performance of the system.

Keywords: *Deep Learning, Content-Based Image Retrieval, Technical, Feature Representation*

1. INTRODUCTION

The performance of retrieval was completely focused on feature representation and similarity measurement present in multimedia and it was implemented by various researchers. The challenge to retrieve the image at its utmost efficiency can be achieve through Artificial Intelligence (AI) and its various techniques by building and training am proper set of data to which interact same as that of human. Till date various machine learning algorithm and transformation techniques was used to have a breakthrough solution for the same. Attempt was also made in deep learning architecture for the retrieval of image. Deep learning pattern and certain process information can have a good representation in the process. Some deep learning methods helps to generate the human design feature which does not required any intervention of human. Many deep learning techniques basically used to object recognition, image processing and much other important system.

1.1 Content Based Image Retrieval System

Color, texture and shape are the basic content of any image. Figure 2 shows the decent structure of content based image retrieval system. Retrieving of image was carried in consideration of query inserted and database available. Image was a combination of low level feature of color, shape and texture and its characteristics can be directly obtained from the image as compared to the previously calculating method of resolving high level features. The concept proposed was indirectly used to make the image retrieval process in consideration with retrieval of shape feature, texture feature and color feature

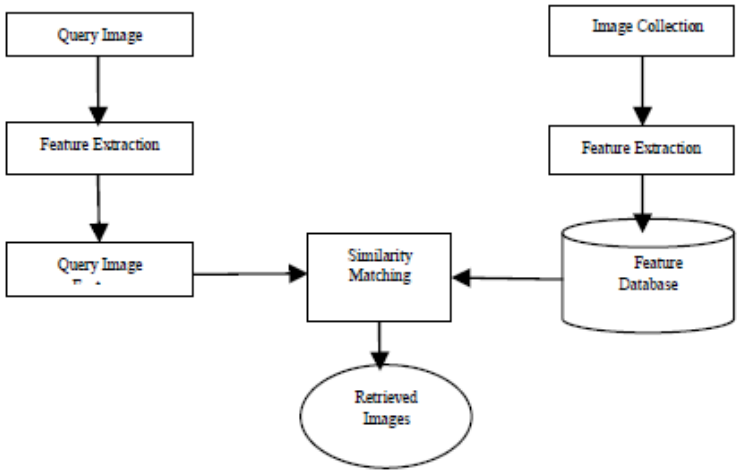

Fig. 1: Representation of CBIR system

1.2 What is Deep Learning?

A method which resolved the issue by using sophisticated data and uses artificial neural network as a main component in it. It basically works on the structure that replicates the feature of human brain and its sensitivity. It refers to learn from the examples and the machine trained and works accordingly to it. E-Commerce, Entertainment and advertising are the various industries where machine learning algorithm was implemented.

1.3 Defining Neural Networks

Nodes in neural network was similar to the human brain neurons and are divided in three layesr viz. Input Layer, hidden Layer and Output Layer

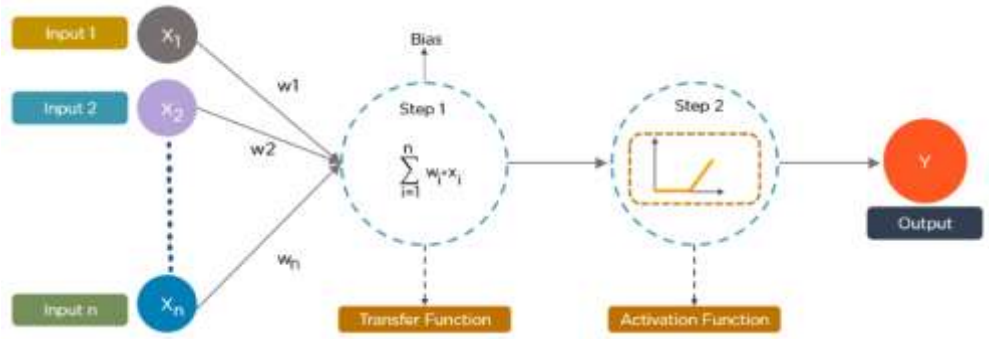

Fig. 2: Image retrieving using color histogram.

Inputs to nodes are provided through some data and processed information. This node multiplies the inputs with certain weights and calculates them and adds a bridge to manage the input and output. And then the activation function was used to activate the neuron for further process.

2. RELATED WORK

Our research lies in the interplay of content-based image retrieval, distance metric learning and deep neural network learning. We briefly review each group of related work below. 2.1 Content-Based Image Retrieval Content-based image retrieval (CBIR) is one of the fundamental research challenges extensively studied in multimedia community for decades CBIR aims to search for images through analyzing their visual contents, and thus image representation is the crux of CBIR. Over the past decades, a variety of low level feature descriptors have been proposed for image representation, ranging from global features, such as color features, edge features, texture features , GIST , and CENTRIST , and recent local feature representations, such as the bag-of-words (BoW) models using local feature descriptors.

During survey of related work in field of agriculture; it is found that earlier research has been carried using image processing and computer vision technologies for detection and classification of plant diseases (leaf, flowers, fruit etc.). Very little research is found in domain of CBIR specifically developed for plant disease identification. Meunkaewjinda et al. (2008)[7] proposed automatic plant disease diagnosis system which uses multiple artificial intelligent techniques for grape leaf diseases. Self-organizing feature map and back propagation neural network is used to recognize the colors of grape leaf. Further a modified Self-organizing feature map is used for segmentation and support vector machine for classification. The average percentage of diagnosis achieved with this method is 86.03%. Self-organizing feature map is also used to detect disease of cotton leaves (Gulhane and Gurjar, 2011)[8]. Kebapci et al. (2011)[9] developed CBIR system for plant image retrieval using color, shape and texture features. Color histogram, color co-occurrence matrix and modified Gabor method based on patch based approach is proposed. SIFT is used to captures local characteristics of the plant and global shape descriptor is used to capture global characteristics of the plant. The experiment is carried for identification of house plants with the accuracy of 73%. The method of automatic identification of wheat diseases is proposed in (Li et al., 2010)[10]. Otsu algorithm is used to extract the lesion area from the image. Fourteen different morphological characteristics are obtained from segmented region are filtered by using principal component analysis. Around 85% disease detection rate is reported The plant image retrieval method based on plant leaf images is proposed in (SathyaBama et al., 2011)[11]. Color, shape and texture features of leaf are used for retrieval. SIFT is used for shape feature extraction, SIFT in saturation band of HSV color space is used for color feature extraction and log Gabor wavelet in SIFT is used to extract texture features. These features are combined to retrieve the leaf images. The retrieval efficiency of about 97.9% is achieved. Plant disease detection technique is developed by Anand and Ashwini (Kulkarni and Patil, 2012)[12]. The technique uses Gabor filter and artificial neural network. 91% performance is achieved through this technique. An automatic plant disease detection techniques based on histogram matching is proposed in (Kailey and Sahdra, 2012)[13].

3. ANALYSIS OF PROBLEM

In consideration with deep learning methods we try to explore the concept for image retrieval application. With the importance of deep learning for image classification and recognition this area of image retrieval was not properly explore.

In this proposed system we try to generalize some methods of deep learning by considering its representation and classifications. Following are the main proposed theme that we are exploring:

(i) Feature representation

(ii) Previous methods were compared in percentage for accuracy and extending the accuracy percentage.

(iii) Applying to the new method of model training so as to get proper result.

4. PROPOSED METHOD

Proposed system mainly focused on multi feature image retrieval concept. The feature which we used to refer comprises of color

histogram, edge directions, and texture features. In our method we extract the content from the collection of image groups (color, texture and shape) formed through some image dataset. After pre-processing procedure such as selection and removal this final feature was stored in some dedicated files which performs the operation of comparison. And the result of this feature was calculated by the distance calculation of similarity index to find out the exact retrieval process

5. CONCLUSION

In this way the content based image retrieval system has a crucial parameter for effective and similarity measurement. The main intension to retrieve the image through its feature classification by making groups of features and calculating the weight and distance so as to find out the exact image retrieval concept was achieved. Also the semantic gap between the low level and high level of pixel value was reduced at some extent. By making use of some machine learning techniques it was possible to find out the solution of image retrieval through content based classification and indirectly helps to improve the system.

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