A Survey of Content Based Image Retrieval Mechanism

Rahul Malviya[1], Prof. S.R. Yadav[2]

[1]PG Scholar, [2]Head, P.G.

CSE, MITS, Bhopal

Abstract - The conventional CBIR is not perfectly suitable for retrieving the images from the large image dataset. The basic problem is generated from conventional CBIR method are: First, Whenever users perform the image search on google since unnatural and unsupported data is retrieve from www. Second, it is very time consuming, due to this reason perfect result is not obtained in given time duration. Basically Content-based image retrieval is uses for retrieving the similar images from image dataset on basis of sample query image. To overcome the above problem, the proposed scheme improved the performance of image classification and retrieval accuracy of images. The PSO method is used to optimize the feature of image dataset. These feature of reflects texture level of various images. Optimization feature descriptor in the ROI (region of interest) of image using PSO (Particle of Swarm Optimization) Technique. Optimized image descriptors are classified in different classes of image dataset using artificial neural network. ANN is used for image retrieval to maintain accuracy. This supervised learning approach uses the concept of image optimizer to improve the performance of retrieved images. The performance of proposed method ANN-PSO (Artificial Neural Network – Particle Swarm Optimization) method is improved instead of comparable CBIR method.

Keywords: Artificial Neural Network, Particle Swarm Optimization, Feature Descriptors. ROI, CBIR, Image Dataset.

1. INTRODUCTION

CBIR is one key design task, when constructing image dataset, which is built of an effective associate's feedback component. While it is sometimes possible to arrange images within an image database by creating a hierarchy, or by hand-labeling each image with descriptive words, it is often time-consuming, costly and subjective. Alternatively, requiring the end-user to specify an image query in terms of low level features (such as color and spatial relationships) is challenging to the user, because an image query entry is hard articulation can again be subjective. Thus, there is a need to allow a user for implicit information database to obtain desired output or query concept. To address this requirement, relevance feedback can be used as a query refinement scheme to derive or learn a user's concept. To solicit return, the refinement approach displays a few image instance and the user labels each image as relevant or \not relevant. Basis on the replies, extra set of images set from the repository are brought up to the user for labeling. After some number of such querying loops, the extraction approach returns a number of dataset in repository that it believes will be of interest to the user. The construction of such a query refinement scheme (we call it a query concept learner or learner hereafter) can be regarded as a machine learning work. Normally, it can be seen as a situation of group-based supervised learning. In pool-based active learning the learner has access to a pool of unlabeled data and can request the user's label for a certain number of objects in the cluster. In the case of image retrieval work, the unlabeled group would be the entire database of images. An instance would be an image, and the two possible labeling of an image would be relevant and not relevant. The objective for the image dataset is to learn the user's image query concept. In other words the goal is to give a label to each image within the database such that for any image, the learner's labeling and the user's labeling will agree.

2. SYSTEM MODEL

In Content Based Image Retrieval (CBIR) Content-based means that the search will analyze the actual contents (features) of the image. In the image two types of features are present Low Level Features and High Level Features. High level features like emotions in an image, or different activities present in that image. Extracting High level features from image is very difficult and time consuming, but they gives relatively more important meanings of objects and scenes in the images that are perceived by human beings. So low level features like color, texture and shape are used for retrieval of the image. These low level features can be easily extracted from the image. These features are extracted from the query image and same features are extracted from the images present in the database. These features are compared by using similarity measurement algorithms of ANN (Artificial Neural Network) and closest images of the query image are retrieved. A query image is nothing but an image you already have, or you can draw rough sketch and use it as query. Images retrieval using content based technique is useful in many areas like medical diagnosis, satellite communication, security, crime prevention, web searching, home entertainment etc.

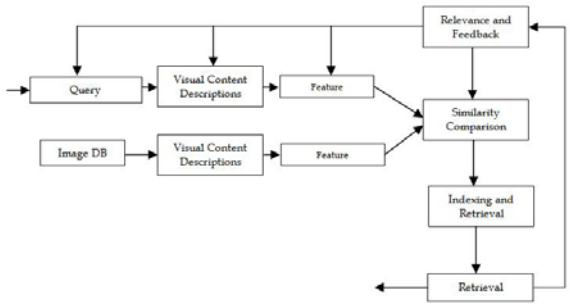

Figure 1: Block Diagram of Image Retrieval Process

There are large numbers of images present in the image database. We have been uses the WANG Database of 90 images for our project which contains images in 'jpeg' format. Initially query image is given than low level features like color texture and shape are extracted from the query image. For color feature extraction three color moments are used in three color channels, so there are 9 color features. For texture feature extraction we have used 3 Level DWT, so there are total 9 texture feature and. For shape feature extraction canny edge detection method is used. There are 18 shape features. Total 36 features of query image are extracted. Then feature vector is calculated. Same features are extracted from the images present in the image database. The database is made to store the feature vectors calculated for the images present in the database. After feature extraction next step is similarity measurement. For similarity measurement different algorithms of Artificial Neural Networks (ANN) are used. The top closest images of the query image are retrieved. The search is usually based on similarity rather than exact match. Then user gives the feedback in the form of 'relevance judgments'. Relevant images are the images obtained in first iteration which are from the same class as that of Query. In first iteration, these values are relevant and non-relevant .Relevant means the image relevant to the user and non-relevant means the image is definitely not relevant. If the user is satisfied with the obtained results, then feedback loop stops otherwise it continues until user gets satisfied with results. In Fig. 1, the block diagram consists of following blocks image database, log database, feature extraction, similarity measurement, and feedback algorithm. Finally, obtained results are compared using certain parameters like Accuracy, Precision, Recall rate etc.

3. LITERATURE REVIEW

Machine learning and relevance feedback techniques have been proposed to learn and to refine query concepts. The problem is that most traditional techniques require a large number of training instances [2, 3, 4, 6, 7], and they require seeding a query with "good" examples [8, 15, 16, 20]. Unfortunately, in many practical scenarios, a learning algorithm must work with a scarcity of training data and a limited amount of training time. Ensemble techniques such as bagging [3], arcing [4], and boosting [8, 12, 14] have been proposed to improve classification accuracy for decision trees and artificial neural networks. These ensemble approaches enjoy achieve success in improving classification accuracy through bias or variance feedback while they do not support reduce the number of samples and time required to learn a basic query concept. Generally, most ensemble approaches actually increase active learning time because they introduce learning redundancy in order to improve prediction accuracy [8, 11, 12, 13]. To reduce the number of required data samples, many people have conducted many studies of active learning [2, 8, 9, 18] for classification. Active learning can be modeled formally as follows: Given a dataset S consisting of an unlabeled subset U and a labeled subset L, an active learner has two components: f and q. The f component is a classifier that is trained on the current set of labeled data L. The second component q is the sampling function that, given a current labeled set L, decides which subset u in U to select to query the user. The active learner returns a new f after each round of relevance backward result. The sampling approaches employed by determine active learner determine the selection of the next batch of unlabeled instances to be labeled by the user.

Genetic Programming use concept of relatively low-level parameters, which are defined separately rather than combined a priori into high-level parameters, since such strategies explore hierarchical outline that would facilitate the creation of new high-level primitives from built-in low-level primitives [3] [4] [5].

Unfortunately, since every real life problem are dynamic problem, thus their behaviors are much complex, GP suffers from serious weaknesses random systems. Chaos is important, in part, because it helps us to cope with unstable system by improving our ability to describe, to understand, perhaps even to forecast them. Ant Colony Optimization (ACO) is the result of research on computational intelligence approaches to combinatorial optimization originally conducted by Dr. Marco Dorigo, in collaboration with Alberto Colorni and Vittorio Maniezzo [6]. The fundamental approach underlying ACO is an iterative process in which a population of simple agents repeatedly construct candidate solutions; this construction process is probabilistically guided by heuristic information on the given problem instance as well as by a shared memory containing experience gathered by the ants in previous iteration. ACO has been applied to a broad range of hard combinatorial problems. Problems are defined in terms of components and states, which are sequences of components. Ant Colony

Optimization incrementally generates solutions paths in the space of such components, adding new components to a state. Memory is kept of all the observed transitions between pairs of solution components and a degree of desirability is associated to each transition depending on the quality of the solutions in which it occurred so far. While a new solution is generated, a component y is included in a state, with a probability that is proportional to the desirability of the transition between the last component included in the state, and y itself [7]. The main idea is to use the self-organizing principles to coordinate populations of artificial agents that collaborate to solve computational problems. Self-organization is a set of dynamical mechanisms whereby structures appear at the global level of a system from interactions among its lower-level components. The rules specifying the interactions among the system's constituent units are executed on the basis of purely local information, without reference to the global pattern, which is an emergent property of the system rather than a property imposed upon the system by an external ordering influence. For example, the emerging structures in the case of foraging in ants include spatiotemporally organized networks of pheromone trails [8][9][10]. The aim of this work is to enhance the ability of ACO by using GP technique.

4. METHODOLOGY

CBIR technique can be implements with MATLAB R2010a and R2012a version which is described below.

MATLAB is a high-performance, efficient and interactive language for technical computing environment for implements CBIR. It integrates Computation, visualization, graphical, processing and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical syntactic notation and graphical form. Typical uses include mathematical matrix form and other computation algorithm development data acquisition modeling, image processing, data processing, simulation, and prototyping data analysis, exploration, and visualization scientific and engineering drawing and graphics application development, including graphical user interface building MATLAB (A Technical Computing Tool) is an interactive programming tool whose basic data element is an array (matrix form) in different dimensional scheme, that does not require to specify dimensioning. This allows to solve many technical computing problems in different format, especially those with matrix and vector formulations, in a small fraction of the time it would take to write a program in a specific scalar non interactive language like as C or FORTRAN. The name MATLAB is stands for matrix laboratory. MATLAB is used in every facet of computational mathematics. Following are some commonly used mathematical calculations where it is used most commonly: Dealing with Matrices and Arrays, 2-D and 3-D Plotting and graphics, Linear Algebra, Algebraic Equations, Non-linear Functions, Statistics, Data Analysis, Calculus and Differential Equations, Numerical Calculations, Integration, Transforms, Curve Fitting, Various other special functions.

MATLAB has evolved over many periods of years with different input from many more users. In university research environments, it is the standard and efficient instructional tool for introductory and advanced courses in mathematics, engineering, and medical science. In engineering industry, MATLAB is the tool of choice for better high-productivity research, development, proactive and analysis. MATLAB provide basic features a family of add-on application-specific solutions called toolboxes. Very most important to most and licensed users of MATLAB toolbox allow learning and applying specialized computing technology. The basic features of MATLAB are as follows:

(1) It is a high-level language for numerical computation, visualization and application development.

(2) It also provides an interactive environment for iterative exploration, design and problem solving.

(3) It provides vast library of mathematical functions for linear algebra, statistics, Fourier analysis, filtering, optimization, numerical integration and solving ordinary differential equations.

(4) It provides built-in graphics for visualizing data and tools for creating custom plots.

(5) MATLAB's programming interface gives development tools for improving code quality and maintainability and maximizing performance.

(6) It provides tools for building applications with custom graphical interfaces.

(7) It provides functions for integrating MATLAB based algorithms with external applications and languages such as C, Java, .NET and Microsoft Excel.

MATLAB is widely used as a computational tool in science and engineering encompassing the fields of physics, chemistry, math and all engineering streams. It is used in a range of applications including: Signal Processing and Communications, Image and Video Processing, Control Systems, Test and Measurement, Computational Finance, Computational Biology

5. CONCLUSIONS

In this paper we have been elaborate the distinguish kinds of image retrieval procedures. Most generalize approach for image retrieval is the supervised learning approach. Image retrieval is one of the most in all, the foremost effective work in image processing atmosphere. During this research paper, we have got discuss varied programming algorithmic strategies and tabulated varied argument. We have notified that high fused image quality index is most important concern in image processing environment. This paper presents a survey of image retrieval procedures in image processing environment. Main objective of image retrieval procedure is to gain more performance in image processing atmosphere by optimal usage of storage capacity and other resources. This research would next focus on finding optimal approach for better performance of applications running in image retrieval.

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