



Research Journal of
**Information
Technology**

ISSN 1815-7432



Academic
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Unsupervised Neural Network for Content Based Image Retrieval by Utilizing Content and Model Annotations

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ABSTRACT

Description of content as well as semantics is important in Content Based Image Retrieval. Even though the image gets interpreted semantically, the retrieval accuracy of CBIR systems is often low. Many CBIR systems still rely on text retrieval technologies on human labeled keywords. Identifying and Learning the interest point of humans are critical components in Image reclamation. This manuscript advises a Neural Network scaffold that incorporates unsupervised learning in to query refinement process. In order to indentify the user interest point we have used this as a relevance feedback approach which easily maps stumpy characteristics with user's lofty concept. Experimental results illustrate the effectiveness of this approach.

Key words: Unsupervised learning, relevance feedback, content based image retrieval

INTRODUCTION

Of keyword based text recovery practices, Content Based Image Retrieval (CBIR) modus operandi has by now coped up the clients' outlook. Recent researches focus on content analysis of an image, semantic interpretation and user point of interest. Researchers used various RF algorithms with the purpose of bridging gap flanked by the user and retrieval system (Cox *et al.*, 2000; Peng *et al.*, 1999; Rui and Huang, 2000). Many search engines are not matching the semantic perception and human subjectivity. It is very difficult to specify the point of interest or what combination he wants to retrieve. To address this problem, an unsupervised learning/mining method is proposed. This approach dynamically discovers a user point of interest which allows the image recovery anchored in user subjectivity. The purpose of this method is en route for conducting fissure amidst subordinate traits of image and subjectivity of the user with respect to the image.

In order to find out client's nigh engrossed point with in a certain image, initially it acquires the pros of RF in repossession course.

Image is a collection of instances or objects, from the relevance feedback; the unsupervised learning refinement scheme guides the search through the labels such as "relevant" or "not relevant". Firstly, we adopt the image segmentation and annotation (Ambika and Samath, 2012) which scrutinizes image via subdividing the image to entities, choosing primal entities and finally extorting feature signifiers possessed by these entities. Secondly, this framework uses users feed back in the retrieval process. The reason to select user feedback is that the framework finds the precise and relevant object from the retrieved result. Irrelevant ones may also have similarities with the query image but may have different perception in user's point of interest. The framework can easily distinguish the point of interest from the irrelevant or unrelated objects. The new

learning structure is capable of realizing the best characteristic vector associated with an object of every image and its importance through adaptative reibrating by means of neural network construct.

The remaining part of this article is structured like the following. First, Content analysis and annotation are described. Then the next section introduces the unsupervised learning framework and neural network architecture used in the CBIR system. The succeeding section is results and experimentation of proposed framework. Later, the conclusion and future enhancement is given.

CONTENT ANALYSIS AND ANNOTATION

Reprocessing (Ambika and Samath, 2012) the image through fractioning in to individual fragments with object espial and picking solitary key module from entities serves like a delegate element. Extracted visual descriptors of the image get assimilated in storage scheme which is used as input and allots semantic tags for all objects. This plot extracts color histogram, grid based color histogram, edge histogram and texture descriptors for each of the key-objects and objects. These descriptors get interpreted and labeled discretely. It facilitates establishing resemblance among uncertainties and images on the word of compound lineaments.

Relevance Feedback (RF) (Rui *et al.*, 1998) grants user to revive images according to his interest where he or she is capable to choose most appropriate objects of an image thus providing predilection of weights to each one. Result of this relevance feedback is then used to refine the retrieval process using proposed framework. It is an iterative process until the query vectors and associated weights of user point of interest is identified.

Most of the researchers (Aksoy *et al.*, 2000; Chang and Hsu, 1999) used Relevance feedback as maintained by subordinate features but here the script takes the advantage of semantic content assigned with each image. Based on relevance feedback, to discover the relevant and irrelevant objects of an image we used the segmentation proposed by Ambika and Samath (2012). Next section gives the description about the unsupervised learning framework to discover user's interest point and interpret the semantics of each object.

UNSUPERVISED LEARNING FRAMEWORK

Each object of an image gets a label like relevant otherwise irrelevant in traditional supervised learning approach. In this frame work, label of individual object is unknown. Collection of labels referred as container. CBIR has only two tags which are pertinent and unrelated. If the container is labeled is irrelevant if and only if all its objects are irrelevant. The learning rule for the proposed framework is defined as follows.

Given a set of objects O , set of labels $L = \{1 \text{ (relevant), } 0 \text{ (irrelevant)}\}$, a set of containers $C = \{C_i, i = 1, \dots, n\}$ and the learning rule f is defined as an unsurpassed estimate of factual anonymous function.

Let $X = \{C, L\}$ denote the learning rule where $C = \{C_i, I = 1 \dots n\}$ where n containers and $L = \{L_i, i=1..n\}$ are labels. Here, learning function maps the object to its label and container to its label. The learning rule is defined as relevant if at least one its object is relevant otherwise irrelevant.

Figure 1 shows that the learning rule maps each object O_{ij} in container C to its L_{ij} . Best approximation is $f(C_i) = \text{Max}\{f(O_{ij})\}$.

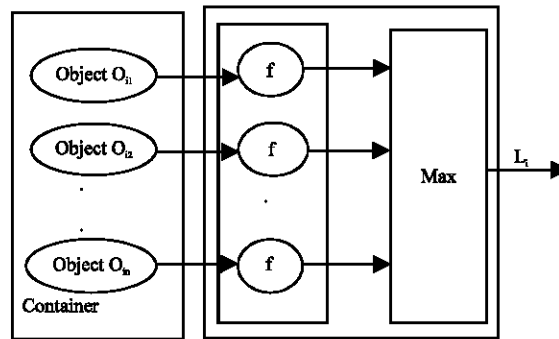


Fig. 1: Learning rule of the proposed framework

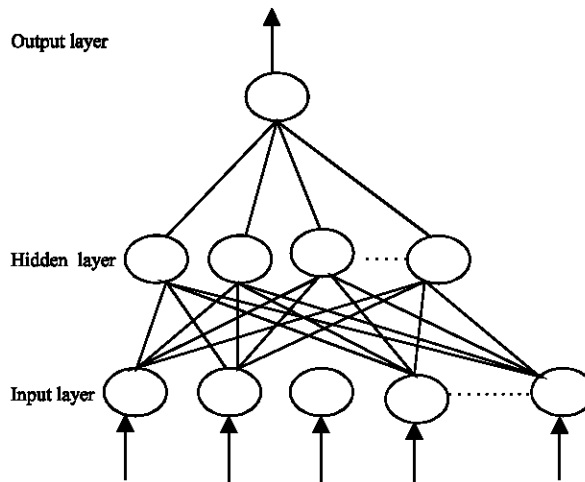


Fig. 2: Three layer feed forward network

Unsupervised Learning is trained with three layer feed forward network Fig. 2 which maps the object of an image in to user's point of interest. In this framework according to eight low-level color, texture and shape features, we have eight neurons in both input and veiled layers, one in that of the output which set sigmoid activation function.

RESULTS AND EXPERIMENTATION

The proposed unsupervised learning neural network framework is publicized in Fig. 2. User is allowed to choose his inquiry image through browse button and the search button to perform the search. The search results are displayed based on their similarity values; user can give his concept of interest by the use of label list (relevant or irrelevant) provided in the framework. Then the interest point is discovered by the learning system and relevant images are pulled from the database by the refined query. The proposed framework is tested by number of experiments it converges after 4 iterations and also user's interest point is discovered to improve the query performance.

In the result Fig. 3, the user's point of interest is the object elephant. Thus, user affords RF by labeling image with relevant or irrelevant tags. Then framework discovers users' point of

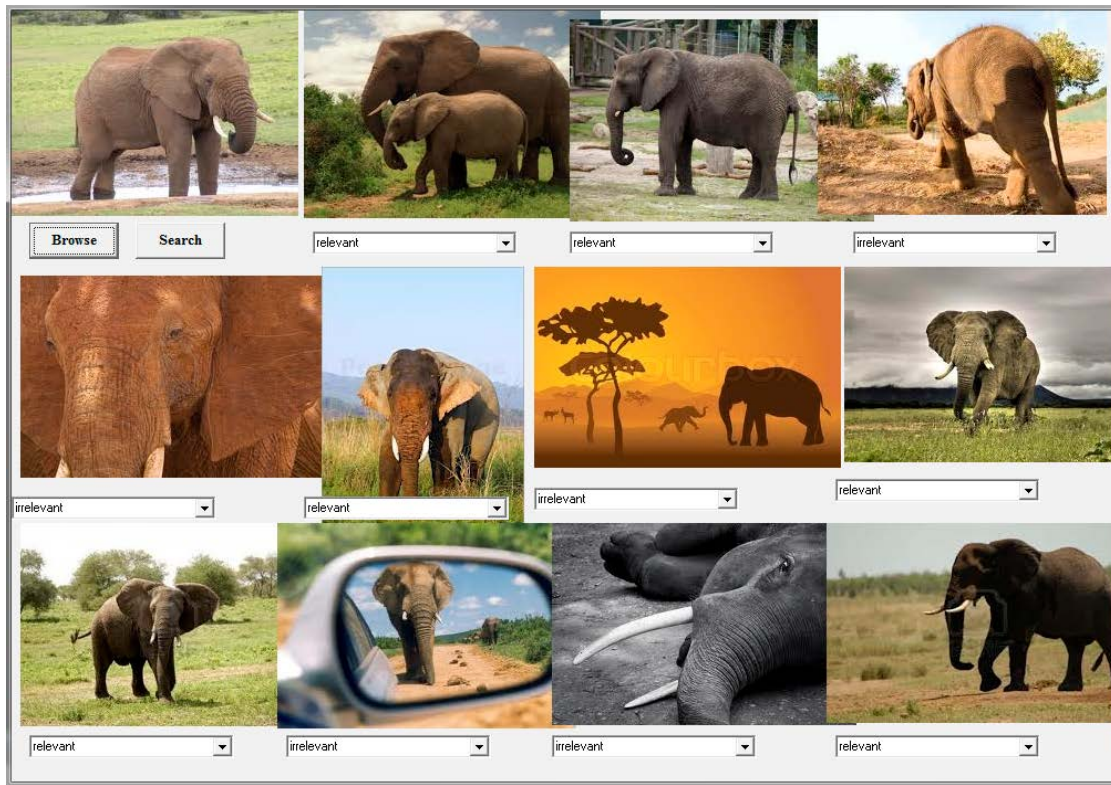


Fig. 3: Output of query results by the proposed framework

interest is an image with elephant object. Some irrelevant images are retrieved due to similarity in color of the object. The experimental result shows the efficiency of proposed framework.

CONCLUSION AND FUTURE ENHANCEMENT

This study proposed an unsupervised neural network framework to discover user point of interest from low-level image features and semantic annotations using Relevance Feedback. Initial point of interest is obtained by relevance feedback and specific point of interest is discovered by the learning rule. This approach is justified by exposing it into high-tech image catalogs that led to elevated efficiency. Experiments were conducted and the experimental result showcases its effectiveness. We are currently working on heuristics with the aim of approximating iterations on the road to discover precise point of interest.

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