

A Review on Content Based Image Classification Techniques

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Abstract— Image classification is essential field of research in computer vision. Growing rate of multimedia data, remote sensing as well as web photo gallery require a category of different image for the proper retrieval of user. Various researchers are relevant dissimilar approach for image classification such as segmentation, clustering and some machine learning approach intended for the classification of image. Content of image such as color, texture and shape and size plays an important role in semantic image categorization except the proper selection of feature are challenging task of classification, so various authors apply a few machine learning approach for image classification such as decision tree, RBF network, Markova model and support vector machine.

Key words: Image classification, Support Vector Machine (SVM), Feature Extraction, Machine Learning

I. INTRODUCTION

Content-based image classification is intended at well-organized classification of relevant images from large image databases which is based on automatically derived imagery type. These imagery features are typically extracted from shape, texture, color properties of uncertainty image as well as images in the database. Potential application includes Web searching, digital libraries, commerce, biomedicine, surveillance, geographic information systems and sensor systems, crime prevention, commerce, education etc. Image class refers to the labeling of images into one of a number of predefined categories [1][2]. Although this is typically not a very difficult task for humans, but it has proved an extremely difficult problem for machines. Main resources of difficulty include variable and sometimes uncontrolled imaging conditions, hard-to-describe with complex objects in an image object; objects occlude other objects, and gap between arrays of numbers representing physical images along with conceptual information perceived by humans [3][4]. Designing the automatic image class algorithms has been an significant research field in recent decades. Potential applications include Web searching, digital libraries, geographic information systems, biomedicine, surveillance, commerce, sensor systems, and education. In conditions of classification, image class can be applied as a preprocessing stage that means grouping images in the database into semantically meaningful categories. Within the areas of pattern recognition, image processing and computer vision; there has been abundance of prior work on recognizing, detecting along with classifying a relatively small set of objects or concepts in specie domains of application. In the function of classification features extraction play a important role. Content classified image such as color texture as well as dimensions having the lower features. For machine learning approach [5] used as proper assignment of class of features. There are mainly two event are occurred such as iteration machine and another one is statistical approach. In modern trend support vector machine is significant tools for image

classification. For the diversity of support vector machine also suffered various problems such as outlier problem and core point problem. Now in this problem reduced by other research using some optimizations technique as well as get better the rate of classification of data. In modern trend support vector machine is significant tools for image classification. For the diversity of support vector machine also suffered various problems such as outlier problem and core point problem. Now in this problem reduced by other research using some optimizations technique as well as get better the rate of classification of data.

State-of-the-art image machine learning methods require an intensive learning/training stage. In contrast, non-parametric Nearest-Neighbor (NN) based image classifiers need no training time and has other favorable properties. However, the huge performance gap among these two families of approaches rendered NN based image classifiers and decision tree or support vector machine [6].

II. SUPPORT VECTOR MACHINE (SVM): AN OVERVIEW

SVM was earliest planned by Vapnik in addition to it gives higher better performance in classification of image than other data classification algorithm. It is mostly used in real world problem similar to voice recognition, tone recognition, text categories, image classification, data classification, object detection and handwritten digital recognition. Image classification is the method of collecting analogous type of images in a single set. Manual browsing the database to look for identical images would be not practical because there is a large amount of database and it would be increased day by day. To progress the result of classification extract related features, because we also want good accuracy. Previous image classification system should consists some problems because users want to complete their search in a single step such as on time consuming problems, web and also some noise should be added to the resulting image. Earlier working with neural networks for supervised learning as well as unsupervised learning. They show good results when used for applications such as supervised learning and unsupervised learning. Multilayer perception uses feed forward as well as recurrent networks. MLP shows multiple inputs and outputs for universal approximation of continuous nonlinear function.

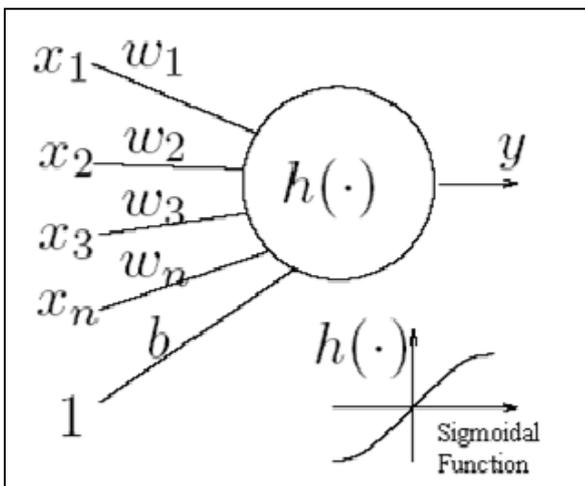


Fig. 1: Simple Neural network

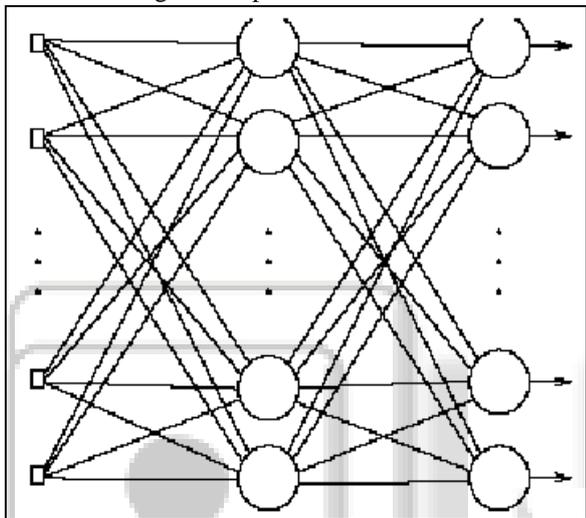


Fig. 2: Multilayer perceptron

These are simple visualizations just to have an overview as how neural network looks like.

Initially working with neural networks for supervised as well as unsupervised learning showed good results while used for such learning applications. Multilayer Perceptions (MLP's) uses feed forward as well as recurrent networks. Multilayer perceptions properties consist of universal estimate of continuous nonlinear functions with include learning with input-output patterns in addition to it involve advanced network architectures with multiple inputs and outputs. There can be various issues noticed. Some of them are having many local minima and also finding how many neurons might be essential for a task is a further issue which determines whether optimality of that NN is reached. Another thing to note is that, if the neural network solutions used tends to converge, this may not result in a unique solution.

III. RELATED WORK

Jisha.K.P, Thusnavis Bella Mary. I, Dr. A.Vasuki, [7] proposed the semantic based image retrieval system using Gray Level Co-occurrence Matrix (GLCM) for texture attribute extraction. Based on the texture features, semantic explanation is given to the extracted textures. The images are regained according to consumer contentment and thereby lessen the semantic gap between low level features and high level features.

Swati Agarwal, A. K. Verma, Preetvanti Singh [8] The proposed algorithm is enlightened for image retrieval based on shape and texture features not just on the basis of color information. Initially the input image is decomposed into wavelet coefficients these wavelet coefficients provide usually horizontal, vertical and diagonal features in the image. Subsequent to wavelet transform (WT) as well as Edge Histogram Descriptor (EHD) is then used on preferred wavelet coefficients to gather the information of leading edge orientations. The grouping of DWT along with EHD methods increases the performance of image retrieval system for shape as well as texture based retrieves. The performance of diverse wavelets is also compared to discover the appropriateness of meticulous wavelet function used for image retrieval. The proposed algorithm is skilled as well as examined for large image database. The results of retrieval are conveyed in conditions of exactitude and recall and compared through different other proposed schemes to show the supremacy of our scheme.

Xiang-Yang Wang, Hong-Ying Yang, Dong-Ming Li [9] proposed a new content-based image retrieval technique using color and texture information, which achieves higher retrieval effectiveness. Firstly, the image is altered from RGB space to adversary chromaticity space as well as the individuality of the color contents of an image is incarcerated by using Zernike chromaticity distribution moments as of the chromaticity space. After that, the texture attributes are extracted using a rotation-invariant as well as scale-invariant image descriptor into the contour-let domain, which presents the proficient and flexible estimation of early on processing in the human visual system. Lastly, the amalgamation of the color and texture information provides a dynamic feature set for color image retrieval. The experimental results reveal that the proposed color image retrieval is more accurate as well as efficient in retrieving the user interested images.

S. Manoharan, S. Sathappan [10] implemented the high level filtering wherever they are using the Anisotropic Morphological Filters, hierarchical Kaman filter also particle filter proceeding with feature extraction method based on color as well as gray level feature also subsequent to this the results were normalized.

Heng chen, zhicheng zhao[11] authors described relevance feedback method for image retrieval. SVM-based RF algorithm is proposed to advances the presentation of image retrieval. In classifier training, a model growing process is adopted to stability the proportion of positive samples as well as negative samples. After that a fusion method for multiple classifiers based on adaptive weighting is planned to vote the concluding query results. SVM-based RF scheme is proposed to improve performance of image retrieval. A sample intensifying method is accepted to balance the proportion of positive and negative samples and after that fusion scheme for multiple classifiers based on adaptive weighting is likely to vote the final query results in the classifier training.

Monika Daga, Kamlesh Lakhwani, [12] Proposed a new CBIR classification was being developed using the negative selection algorithm (NSA). Matrix laboratory functionalities are being used to expand a fresh CBIR system which has reduced complexity as well as an effectiveness of retrieval is increasing in percentage depending upon the image type.

Patheja P.S., Waoo Akhilesh A. and Maurya Jay Prakash[13] proposed a novel technique for generalized image retrieval based on semantic contents is offered. The grouping of three feature withdrawal methods specifically color, texture, and edge histogram descriptor. There is a prerequisite to consist of new features in future for better retrieval efficiency. Any combination of these techniques, which is more suitable for the application, can be used for retrieval. This is presented through User Interface (UI) in the form of significance feedback. The image properties analyzed in this work are by using computer vision as well as image processing algorithms. Anticipated for color the histogram of images are calculated, for texture co-occurrence matrix based energy and entropy etc are calculated as well as for edge density it is Edge Histogram Descriptor (EHD) that is found. To retrieval of images, a new design is developed based on greedy approach to lessen the computational complexity.

G. Pass [15] proposed a novel method to describe spatial features in a more precise way. Moreover, this model is invariant to scaling, rotation as well as shifting. In the proposed method segmentations are objects of the images and all images are segmented into several pieces as well as ROI (Region of Interest) technique is applied to extract the ROI region to enhance the user interaction.

Yamamoto [16] planned a content-based image retrieval system which takes account of the spatial information of colours with using multiple histograms. The planned scheme roughly captures spatial information of colors by dividing an image into two rectangular sub-images recursively. The planned process divides an image into dominant two regions using a straight line vertically or horizontally, even while the image has three or more color regions as well as the shape of every region is not rectangular. In each sub-image, the division process continues recursively until each one region has a homogeneous color distribution or the size of every region becomes smaller than a given threshold value. As a result, a binary tree which roughly shows the color distribution of the image is derived. The tree structure facilitates the evaluation of similarity among images.

Image classification is a complex process and people have made great efforts in developing advanced classification techniques for recovering classification accuracy [17]. There are two basic strategies for image classification; the first uses low level features such as color, texture and the second strategy uses intermediate representations [18]. The first approach is usually used to classify only a small number of categories such as indoor versus outdoor, city versus landscape [19]. In [20], indoor/outdoor classification was achieved using color histogram and texture. Vailaya et al. hierarchically discriminate indoor from outdoor and city from landscape using color histograms, color coherence vectors, edge histograms as well as edge direction coherence vectors [21]. Also in [22][23][24] different image classification methods were introduced based on the first approach. Here the main difficulty lies in the gap between the high-level image semantics as well as the low-level image features [25]. Another approach tries to resolve the semantic gap problem using intermediate features. The basic idea of this approach is detection of regions in images and learning from user through classification process [26]. In [27] semantic features to lowlevel features are in use so as to increase classification

performance. Mojsilovic et al. Obtain twenty semantic class as well as verbal descriptions of these classes [28]. In [29] a semantic component is added into the field of image classification by proposing to organize images along three semantic axes. The semantic axes have been resolved through psychophysical experiments. Also in[30][31][32] different image classification methods were introduced based on the second approach.

IV. CONCLUSION

In this review of image classification of content based image, the overview of various methodologies used for content based images are explained briefly. The study also reviews the research on various research methodologies applied for image segmentation and various research issues in this field of study. Also study the neural network system and multiple perceptron. Mainly also studied the second part of this review paper which having Support Vector Machine (SVM). SVM was earliest planned by Vapnik in addition to it gives higher better performance in classification of image than other data classification algorithm. We overviewed and studied the support vector machine.

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