Designs of Artificial Neural Network using Genetic algorithm for effective prediction

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Abstract : In this project, it has been proposed an image classification by using Artificial Neural Network. In this paper, the Implementation for Biological systems which store medical images, would be done. This would have high reliability in real time. The resulting artificial neuron network with center-loss and adaptive spectral-spatial center classifier is abbreviated as ANNC-ASSCC. ANNC-ASSCC is a improved Artificial neural network algorithm for image classification. The real time data in medical services using the algorithm would help in saving human life. Most importantly in the Case of Critical illness which require organ transplant surgery. Therefore to overcome this problem we proposed Genetic algorithm using which we can tolerate the fault and will produced accurate result as the no. of features will be increased using crossover and mutation operations of genetic algorithm. This paper presents the approach which would be applied for such classification, proposed methodology and its implied uses in the field of medical sciences.

IndexTerms **- artificial neuron network; biological system; adaptive spectral-spatial center classifier.**

I.INTRODUCTION

With increase in complexities in human life, the diagnosis plays an important part of present medical facilities. Current diagnosis would result in speedy recovery and also enhancement AHL(average human life). Therefore this paper delves into the entireties of such simplified processes that would enable a medical practitioner to detect the actual disease with certainty. The process of determining relevant image features is often complicated by contradictory tensions at work when images are viewed for diagnostic purposes. A duality arises from the simultaneous but cognitively separable processes in which a global gestalt diagnostic impression is formed simultaneously with an awareness of evidentiary sub-element features. This image is very crucial to disease detection and treatment. Artificial intelligence could find an extra field in this manner to explore the detection viable and simpler. Often could be used in the remote parts of the Country in order to save the lives of millions who are at a risk due to non availability of medical practitioners.

Digital networks have begun to support access to widely distributed sources of medical images as well as related clinical, educational, and research information. The information, however, is voluminous, heterogeneous, dynamic, and geographically distributed. This heterogeneity and geographic spread create a demand for an efficient picture archiving system, but they also generate a rationale for effective image database systems. Without development of the latter, the former would act as a means of communication but would not produce significant new medical knowledge. Picture collections remain an unresolved challenge except for those special classes of images adaptable to geographic information systems (GIS), in which conventional geometry and verifiable ground truth are available. This image is very crucial to disease detection and treatment. Artificial intelligence could find an extra field in this manner to explore the detection viable and simpler. Often could be used in the remote parts of the Country in order to save the lives of millions who are at a risk due to non availability of medical practitioners. There are many classification algorithms available for image classification, but the accuracy can be changed according to the domain of classification. To classify images, various literatures are available for KNN algorithm, ANN algorithms. In image classification, feature extraction phase is very important phase which may change as per the dataset requirement. In this project we proposed ANN algorithm for classification along with careful software planning to avoid bugs in case of any failure to improve accuracy of the classification. In this project we will use improved technique named as Artificial Neural Network with center loss and spectral-spatial center classier along with GA.

1.1 Objectives

- To develop a web application for images classification.
- To implement Artificial Neural Network for image classification.

II.LITERATURE REVIEW

In [1], an unsupervised CNN has been proposed to obtain sparse representations, mainly by using the greedy layerwise unsupervised pretraining along with the efficient enforcing of population and lifetime sparsity. Three supervised CNN architectures, referred as 1-D, 2-D, and 3-D CNNs, were investigated in [2]. More specifically, a 3-D CNN could jointly extract the spectral-spatial integrated features by working on data cube composed by a neighborhood of spectra.

The authors enlarged the training set by virtual sample enhancement, and avoided the overfitting issue by a few techniques, such as dropout and 2-norm regularization. Similar strategies were also adopted in a novel CNN architecture proposed in [3]. In [4], a spectral-spatial feature-based classification framework was proposed. To address the increasing intra-class variation and interclass confusion issues in the spectral domain, the spectral feature in low dimensionality was first extracted by the balanced local discriminant embedding method, aiming to increase the interclass variation while keeping the intra-class samples stay close. The deep spatial based feature was extracted by the CNN.

Finally, the fusion feature, stacked by extracted spectral and spatial features, was used to train the classifier. By regarding each pixel as sequential data, the recurrent neural network has been recently applied to hyper-spectral image classification tasks and has achieved promising results [5], [6]. In [6], a bi-directional convolutional long short-term memory network is proposed to automatically extract the deep spectral-spatial features. Taking advantage of pre-training and fine-tuning techniques, relative deep networks have also been investigated in the literature.

Pre training on large-scale data sets other than target data is advisable, since the initial layers of the deep network tend to be generic filters, such as the edge or the color blob detector, which are independent from specific data and transferable for different recognition tasks [7]. Studies in [8] compared three possible practices to exploit existing CNNs, namely full-training, fine-tuning, and using CNNs as feature extractor, finding out that fine-tuning tended to be the best strategy. In [7], a deep multiscale spatial-spectral FE algorithm is proposed to learn effective discriminant features of hyperspectral images.

2. 1 ARTIFICIAL NEURAL NETWORK

The ability to learn, memorize and still generalize, prompted research in algorithmic modeling of biological neural systems. Human brain has the ability to perform tasks such as pattern recognition, perception and motor control much faster than any computer. While successes have been achieved in modeling biological neural systems, there are still no solutions to the complex problem of modeling intuition, consciousness and emotion - which form integral parts of human intelligence….(Alan Turing, 1950). Artificial neural network are an essential part of the review paper as much in image identification. Characteristics of Artificial Neural Networks A large number of very simple processing neuron-like processing elements A large number of weighted connections between the Distributed representation of knowledge over the connections Knowledge is acquired by network through a learning process.

2.2 The Advantages of using ANN

Massive Parallelism – It is the property of being massively parallel. in computing, massively parallel refers to the use of a large number of processors (or separate computers) to perform a set of coordinated computations in parallel (simultaneously). In one approach, e.g., in grid computing the processing power of a large number of computers in distributed, diverse administrative domains, is opportunistically used whenever a computer is available. An example is BOINC, a volunteer-based, opportunistic grid system, whereby the grid provides power only on a best effort basis. In another approach, a large number of processors are used in close proximity to each other, e.g., in a computer cluster. In such a centralized system the speed and flexibility of the interconnect becomes very important, and modern supercomputers have used various approaches ranging from enhanced Infiniband systems to three-dimensional torus interconnects. The term also applies to massively parallel processor arrays (MPPAs), a type of integrated circuit with an array of hundreds or thousands of central processing units (CPUs) and random-access memory (RAM) banks. These processors pass work to one another through a reconfigurable interconnect of channels. By harnessing a large number of processors working in parallel, an MPPA chip can accomplish more demanding tasks than conventional chips. MPPAs are based on a software parallel programming model for developing high-performance embedded system applications. Goodyear MPP was an early implementation of massively parallel computer architecture. MPP architectures are the second most common supercomputer implementations after clusters.

Distributed representation – Given a network of simple computing elements and some entities to be represented, the most straightforward scheme is to use one computing element for each entity. This is called a local representation. The strength of this more complicated kind of representation does not lie in its notational convenience or its ease of implementation in a conventional computer, but rather in the efficiency with which it makes use of the processing abilities of networks of simple, neuron-like computing elements. The distributed representations occur within these localized module.

Generalization ability – Generalization of the ANN is ability to handle unseen data. The generalization capability of the network is mostly determined by system complexity and training of the network. Poor generalization is observed when the network is over-trained or system complexity (or degree of freedom) is relatively more than the training data. A smaller network which can fit the data will have the k good generalization ability. Network parameter pruning is one of the promising methods to reduce the degree of freedom of a network and hence improve its generalization. In recent years various pruning methods have been developed and found effective in real world applications. Next, it is important to estimate the improvement in generalization and rate of improvement as pruning being incorporated in the network. A method is developed in this research to evaluate generalization capability and rate of convergence towards the generalization.

III. Methodology

Medical imaging has been undergoing a revolution in the past decade with the advent of faster, more accurate, and less invasive devices. This has driven the need for corresponding software development which in turn has provided a major impetus for new algorithms in signal and image processing. Modern medical images may be considered to be geometrically arranged arrays of data samples which quantify such diverse physical phenomena as the time variation of hemoglobin deoxygenating during neuronal metabolism, or the diffusion of water molecules through and within tissue. The broadening scope of imaging as a way to organize our observations of the bio physical world has led to a dramatic increase in our ability to apply new processing techniques and to combine multiple channels of data into sophisticated and complex mathematical models of physiological function and dysfunction. A key research area is the formulation of biomedical engineering principles based on rigorous mathematical foundations in order to develop general-purpose software methods that can be integrated into complete therapy delivery systems.

3. 1 Types Of Methods For Image processing

The two types of methods used for Image Processing are Analog and Digital Image Processing. Analog or visual techniques of image processing can be used for the hard copies like printouts and photographs. Image analysts use various fundamentals of interpretation while using these visual techniques. The image processing is not just confined to area that has to be studied but on knowledge of analyst. Association is another important tool in image processing through visual techniques. So analysts apply a combination of personal knowledge and collateral data to image processing.

3.2 Fundamental steps in image processing

1) Image acquisition: to acquire a digital image

2) Image preprocessing: to improve the image in ways that increases the chances for success of the other processes.

3) Image segmentation: to partitions an input image into its constituent parts or objects.

4) Image representation: to convert the input data to a form suitable for computer processing.

5) Image description: to extract features that result in some quantitative information of interest or features that are basic for differentiating one class of objects from another.

6) Image recognition: to assign a label to an object based on the information provided by its descriptors.

7) Image interpretation: to assign meaning to an ensemble of recognized objects.

The proposed methodology will acquire the Dynamics of Input from Various medical set up i.e. hardware, the output will than result in systematic databank identifying with the symptom based analysis for the relevant diseases.

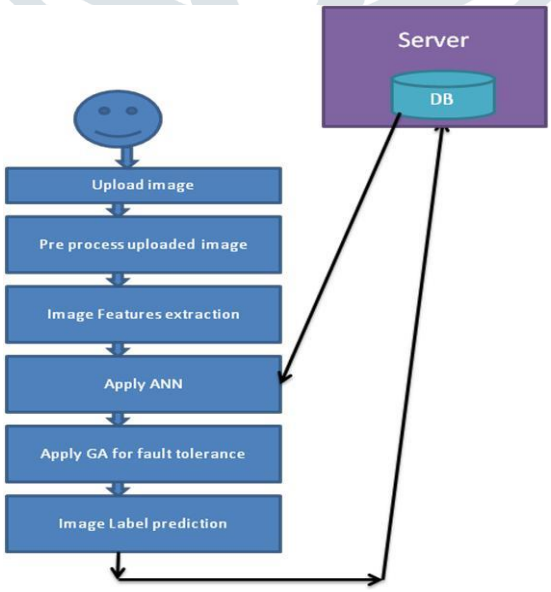

Fig 1: System Architecture Diagram

REFERENCES

[1] A. Romero, C. Gatta, and G. Camps-Valls, "Unsupervised deep feature extraction for remote sensing image classification," IEEE Trans. Geosci. Remote Sens., vol. 54, no. 3, pp. 1349–1362, Mar. 2016.

[2] Y. Chen, H. Jiang, C. Li, X. Jia, and P. Ghamisi, "Deep feature extraction and classification of hyperspectral images based on convolutional neural networks," IEEE Trans. Geosci. Remote Sens., vol. 54, no. 10, pp. 6232–6251, Oct. 2016.

[3] W. Shao and S. Du, "Spectral-spatial feature extraction for hyperspectral image classification: A dimension reduction and deep learning approach," IEEE Trans. Geosci. Remote Sens., vol. 54, no. 8, pp. 4544–4554, Oct. 2016.

[4] S. Yu, S. Jia, and C. Xu, "Convolutional neural networks for hyperspectral image classification," Neurocomputing, vol. 219, pp. 88–98, Jan. 2017.

[5] K. Nogueira, O. A. B. Penatti, and J. A. dos Santos, "Towards better exploiting convolutional neural networks for remote sensing scene classification," Pattern Recognit., vol. 61, pp. 539–556, Jan. 2017.

[6] L. Mou, P. Ghamisi, and X. X. Zhu, "Deep recurrent neural networks for hyperspectral image classification," IEEE Trans. Geosci. Remote Sens., vol. 55, no. 7, pp. 3639–3655, Jul. 2017.

[7] Q. Liu, F. Zhou, R. Hang, and X. Yuan, "Bidirectional-convolutional LSTM based spectral-spatial feature learning for hyperspectral image classification," Remote Sens., vol. 9, no. 12, p. 1330, 2017.

[8] L. Jiao, M. Liang, H. Chen, S. Yang, H. Liu, and X. Cao, "Deep fully convolutional network-based spatial distribution prediction for hyperspectral image classification," IEEE Trans. Geosci. Remote Sens., vol. 55, no. 10, pp. 5585–5599, Oct. 2017.