A REVIEW ON MEDICAL IMAGE CLASSIFICATION APPROACHES

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Abstract : Medical image assortment is an significant role in ranking of an image.For sake of these purpose many imaging modalities were used.Many classification were there for medical image based on texture,grey-scale and color image.Diagnoising of an image will be useful in the education domain for health students by interpret will help them in future studies.Different technique of classification is used for class,pattern representation,feature extraction,feature selection and there performance.Some of technique is employed perfectly for brain tumour,nerve diseases and many other diagnoising diseases.Among techniques ANN,fuzzy is used for brain related problems and SVM is mainly suitable for burn therapy of skin transplantation.

IndexTerms - ANN,Fuzzy,SVM.

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I. INTRODUCTION

. Medical imaging is an irresponsiveness of creating optic representation of inward of a body for clinical analysis and medical intervention as well as visual representation of some organs.Medical image testing is the science of analyzing medical problems based on different modalities and digital image analysis technique.Followin fig 1 depicts the environmental analysis of medical image system.
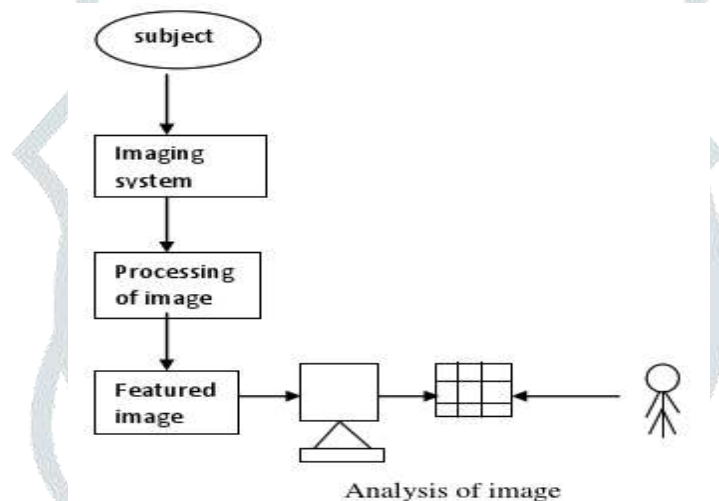

Fig.1 Environment of medical image system

II. ANN

. The Artificial Neural Network (ANN) is a professional computing system that employs an important theme from the analogy of biological nerve networks. ANN is a concept used to process information with a boost from a biological nervous system such as human brain. It is a computerization system inspired by the ability to study organic brain structure and processing. It has a very simple processing neuron and includes topology such as single layer perceptron, multilayer perceptron, competitive networks, and art modules. ANN learns from the environment and collects practical knowledge. ANN has a layer of layers, all nerves of each layer have the set neurons associated with weight connections to all neurons in the rear and lateral layer.Feed forward network, Feedback network and lateral network are including in the manner of ANN.

2.1 Feed forward network

Feed forward network is the simplest nature of neural network, here the information moves only in one route, forward from the input nodes, through the hidden nodes and to the output nodes. It has shown in fig 2
Input network: Number of neurons in this layer corresponds to the number of inputs to the neuronal network. It consists of passive nodes, i.e which do not take part in the actual signal modification, but only transmits signal to the following layer.
Hidden layer: It has subjective number of layer with arbitrary number of neurons. The nodes in this layer take part in signal amendment, hence they are active.
Output layer: The number of neurons in the output layer communicate to the number of the output values of the neural network. The nodes in this layer are active ones.
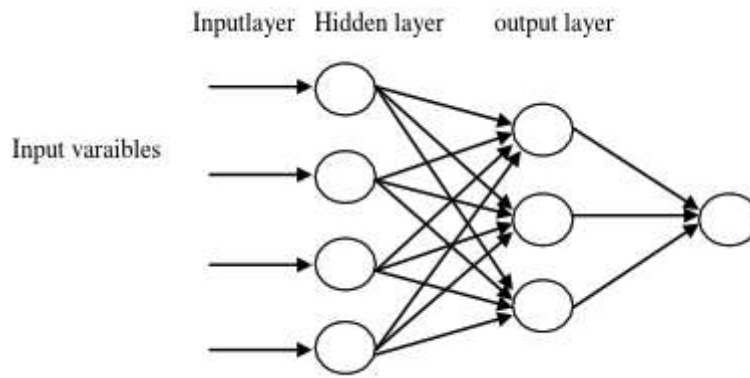
Fig.2 Feed forward network

2.2 Feedback network

The production of neuron is either honestly or notdirectly fed back to its input by means of other linked neurons used in complex pattern recognition task,eg.Speech recognition etc..It has shown in following fig 3
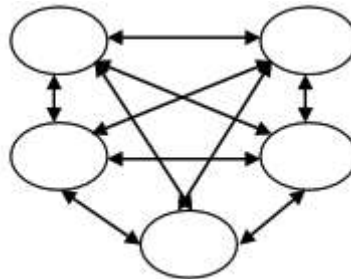

Fig.3 Feedback network

2.3 Lateral network

Around exists coupling of neurons within one layer.There is no essentially open feedback path among the different layers.This can be thought of as a compromise between feedforward and feedback network.
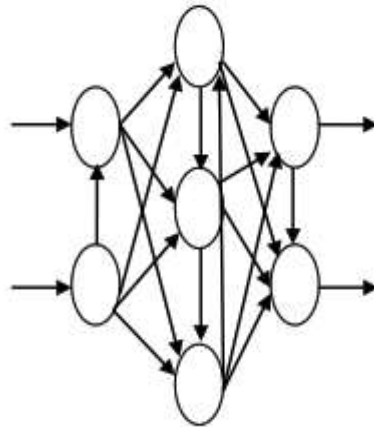

Fig.4 Shows the lateral network.

III. Fuzzy

Fuzzy theory constantly increases the field of clinical diagnosis and progression. It provides a suited character for diagnosis due to uncertainty and the ability to face imperfection in medical diagnosis. Fuzzy theory is important for the identification of the model because its representation way is in the linguistic approach to the best formulation of the input feature. Fuzzy theory is so interesting in the medical imaging process for managing obscure information and knowledge. It provides a consistent mathematical framework for knowledge representation, consistently of modeling at various levels, the union, diverse, and judging of diverse information. In a fuzzy catalog various potential associations decide to describe the properties of the image. Members of these types of characteristics are gathered in a variety of probabilities that are obscured in nature. This allows you to explain the possible properties of different classes in a similar format. Major distortion is used in the MRI split in brain tissue.

IV. SVM

The Support Vector Machine is a hypothetically prevalent machine learning system with awesome outcomes in grouping of high dimensional dataset and has been discovered compitative with the best machine learning algorithms.SVMs have regularly been found to give better arrangement comes about that other generally utilized example acknowledgment techniques.
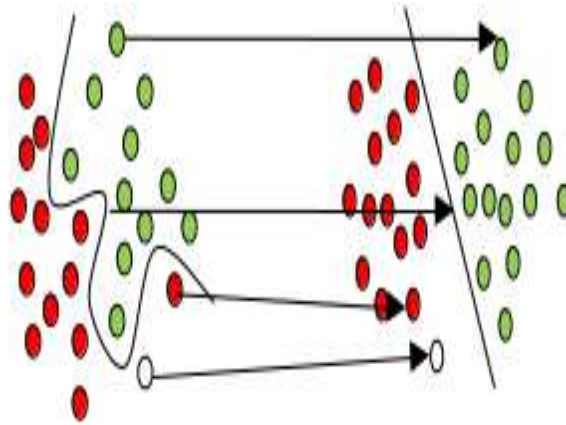
Fig.5 An essential idea behind SVM

Support Vector Machine is a algorithm which can be commute for sorting or relapse(regression) problems .It is base on the thought of choice planes that mark choice boundaries.A choice plane is only that seperates between an arrangement of items having class membership.An illustration is demonstrated as follows, in fig 6(a,b).Here a question have a place either with class green or red.The dealing with line characterize a limit on the precise side of which all articles are green and the left of which every one of the articles are red.Categorization errands in view of attracting seperating lines to recognize objects of various class enrollment is known as hyperplane classifiers.SVM is more appropriate to deal with such tasks.Any protest declining to the privilege is labelled(classified).Above fig 5 exhibit the primal content buttocks SVM. Present we can see the first object(left side of the schematic drawing)is mapped (adjusted) commute an agreement of scientific capacity famed as kernel. The routine of reworking the items famed as mapping(transformation). Note that in this new setting the mapped object(right side of the schematic) is specifically detachable and therefore instead of building the complex curve(left schematic) we should just to find a perfect time that can seperate the green and red articles.

a   b

Fig.6 Linear classifiers

V. COMPARISON

Table: Comparison of different image classification approaches

Parameter	SVM	ANN	Fuzzy
Generalization capability	Good	Less	Less
Complexity	Less	More	More
Flexibility	Good	Comparatively less than SVM	Comparatively less than SVM
Colour Proximity	Easy	Difficult	Difficult
Classifier	Multi class	Non parametric	Non parametric

VI. RELATED WORK

Igor Frolov and Rauf Sadykhov "The Technique for Face Recognition with SVM".In computer revelation development automatic visual control system is a very important research topic. The face identification systems have to be robust to the diverse quality of the images such as light, expression, beards, moustaches etc. Here SVM technology has been used for face recognition. Even though there are many face identification algorithms the tasks of identification still remains a challenging problems because of its fundamental difficulties, like illumination changes,face rotation,facial expression and normalization of image may miss. By the SVM classifier good face recognition results has obtained[1].

S.Nithya and G.Shine Let done a work on Bio-medical Image Retrieval Using SVM.In a large database of digital images.The image can be browsed, searched. Once the images are searched there will be plenty of images will be displayed. Here the forecast of database and query image depends on the outputs of a multiclass SVM classifier. At the beginning irrelevant images are first filter out for similarity matching. Using SVM classification and regression analysis is done. There are many images stored in a database. All the images are not for same diseases,Identification of different images have different kind of diseases. So in order to search a particular image we need to find an image that is stored in a database. That work has done using SVM in this paper[2].

Sonali Jain proposed an machine learning approach using SVM for image classification in CBIR. As we know that image classification is a skill of discovering out a most prominent features of image to the query image. The main task of CBIR(content Based Image Retrieval) is to get ideal result. Many researchers used different methods to classify the large collection of data. But SVM is the best method to extract all the relevance and irrelevance features of images like colour, texture, shape, size, mean, standard deviation, histogram value and entropy. Evaluation of generalization ability is done under the limited training samples. In previous image retrieval system have some problems. As completing of searching, an image can get but their will be possible negative result can be obtained with noisy image. So by the use of CBIR resulting image can be obtained similar to query image from the database and SVM gives optimal result[3].

Filippo Amato, Alberto Lopez, Eladia Maria, Penamendez and Ales Hampl made a survey on artificial neural networks in medical diagnosis[4]. The aim of this paper is to present the general philosophy for the use of ANNs in diagnostic approaches like cancer, cardiovasculardisease etc. CVD(cardiovasculardiseases) are defined as all diseases that affect the heart or blood vessels both arteries and veins. By the back propagation algorithm this disease can be identified. Using the application of ANN breast and overian cancer can be detected[4].

Rajeshwar Nalbalwar,Umakant mjhi and Raj Patil proposed how a brain tumour detection can be analysed by using ANN. Brain tumour is a life aggressive disease. Here the main aim to detect if the patient is infected with brain tumour in a non-invasive way. All radiologists uses MRI images of a patient to detect if he has a brain tumour. Doctor judge the standard MRI image and new MRI image both are taken and perform image processing. Then the image is segmented and enhanced and texture feature extraction using gray level co-occurrence matrix is done. Then using ANN based classifier detection of disease is obtained. The future work is to the classification occuracy by extracting more feature and increasing the training dataset[5]

T.Balakumaran, Dr.ILA.Vennila and C.Gowri Shankar gave some information about Detection of Microcalcification in Mammograms using Wavelet Transform and Fuzzy Shell Clustering. Breast cancer is the second leading cause of cancer death for women and is found in one of eight women in the united states. The fitting method for early exposure of cancerous symptoms is screening mammography and calcification clusters are an early sign of breast cancer. Microcalcification are very small present inside the breast tissue like circles or lines. Micro calcification clusters are missed by radiologists due to its small size, to avoid this problems a new CAD(Computer Aided Diagnosis)system has to be developed to improve the diagnostic rate. So many researchers have proposed the algorithms for microcalcification detection based on descrete wavelet transform. But here author presented the detection of cancer with DWT and CAD system using FSC(Fuzzy Shell Clustering)algorithm. Fuzzy logic is a form of multivalve logic derived from fuzzy set theory to deal with appropriate reasoning[6].

V.Prasath, N.Lakshmi, M.Nathiya, Nithya Bharthan and Neetha N.P made a survey on the applications of Fuzzy Logic in Medical Diagnosis. Here the author presented some information about fuzzy logic used in medical field. It is used in detection of tuberculosis. An optimized fuzzy logic method for magnetic resonance imaging(MRI) brain images segmentation is presented, as well as tumour can be analysed for diagnosis purpose. Fuzzy logic is also used for diagnosis aphasia. Chronic intestine illness symptoms such as sedimentation and prostate specific antigen are used for the design of fuzzy expert system to determine the drugdose. And in many other field how fuzzy logic is used is came to know.Like this, here many importance about fuzzy logic is came across in medical field[7].

CONCLUSION

This paper examine about the different types of techniques used in medical image processing. Each technique has its own advantage and disadvantage. Even though each technique are rapidly used in analysing diseases, ANN and fuzzy are comparatively used for diagnosis of cancer, tumour etc. With the help of SVM also we can diagnosis but ANN and fuzzy is best for that. As we see SVM is used for face recognition we can also used it for analysing of burns. In future SVM is used for skin transplantation is success or failure in what range. SVM supports multiclass classifier and it uses a hypothesis space of linear function in a hyper space.The main advantage of SVM is it provides a good generalization capability and computational complexity is less. So in future SVM has its own application in the pasture of transplantation of skin.

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