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Detection and Classification of Oral Cancer using Neural Networks

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ABSTRACT: Tumor occurs in salivary glands, tonsils and also in neck, head, face and oral cavity. There are various diagnosis method to find the oral cancer such as biopsy method in which a small sample of tissues removed from a part of body and tested in microscope. With the help of image processing the cancer can be analyzed in early stages. Using back propagation neural network the early stages of cancer cells can be identified accurately. And some screening methods . But the drawback is we cannot actually classify detect the tumor of cancer cells as well as couldn't classify how much cells are affected by cancer so in this paper we are going to detect and classify the affected cancerous cell in the oral region by digital image processing techniques feature extraction enables clear visualization of cancer effected areas. Here we use firefly algorithm to detect the cancer tumor in the MRI image. The project is carried out using matlab program.

KEYWORDS: Oral cancer ,Preprocessing ,PNN, GLCM,DWT

I.INTRODUCTION

The cancer which occurs in head and neck region is referred as oral cancer. Highest percentage of oral cancer rates are found in India. The two main risk factors for cause of oral cancer are chewing or smoking tobacco and drinking which is affecting thousands of people's lives every year. Especially people living in small towns and rural areas have less awareness about the effects of consumption of alcohol and also intake of tobacco which is main cause for oral cancer. Here patients have inadequate access to trained doctors with very limited health services. Hence the delay is largely associated with advanced stages of oral cancer.

The survival rate of oral cancer is less because of its difficulty in early detection and diagnosis. After diagnosis very less percentage of patients survive more than 5 years[1]. Timely detection of the disease is important as it will reduce morbidity and mortality rates [2] of oral cancers.

The main motivation of the project is to improve oral cancer detection rate. The main symptoms of oral cancer are similar to other non-threatening oral problems. So when a person notices unusual symptoms they will contact the doctor. The doctor or dentist will take a physical test i.e. he closelyexamines the palate and floor of your mouth, throat, tongue, cheeks and the lymph nodes in your neckIf the doctor could find any abnormal growth or tumor, the patient is asked to take a brush or tissue biopsy. A brush biopsy is a painless test which collects all the cells which are affected from tumor by brushing them onto a slide. For finding cancerous cells, a tissue biopsy is performed by removing a piece of the tissue. The above diagnosis is time consuming and it can affect the survival rate of a patient. Mostly the people who live in remote locations who don't have access to all these medical facility will be the victims of this disease.

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II. LITERATURE SURVEY

A. Performance Analysis of Artificial Neural Networks and Statistical Methods in Classification of Oral and Breast Cancer Stages

In this investigation, one hundred patients with breast cancer and One hundred twenty five oral cancer patients were studied. The data set using TNM variables (tumor size, number of positive regional nodes, distance metastasis, history of breast feeding, menstrual cycle, hereditary etc) of patients were used as input variables for both the classifications. When TNM classification and Chi-Square methods were compared, it was observed that Chi-Square classification closely followed that of clinical investigation .

B. A Review Paper on Computer-Aided Polyp Detection for Laxative-Free CT Colonography

Image-b ased colon cleansing performed on fecal-tagged CT colonography (CTC) allows the laxative-free detection of colon polyps, unlike optical colonoscopy (OC), the preferred screening method. Compared to OC, CTC increases the patient comfort and compliance with colon cancer screening. However, laxative-free CTC introduces many challenges and imaging artifacts, such as poorly and heterogeneously tagged stool, thin stool close to the colon walls, pseudo enhancement of colon tissue, and partial volume effect. We propose an automated algorithm to subtract stool prior to the computer aided detection of colonic polyps. The CAD system runtime decreased to roughly 10 min per case after cleansing due to the elimination of several false detections

C.Fully Automated Three-Dimensional Detection of Polyps in Fecal-Tagging CT Colonography

Pseudo-enhancement was minimized by use of an adaptive density correction (ADC) method. The presence of tagging was minimized by use of an adaptive density mapping (ADM) method. We also developed a new method for automated extraction of the colonic wall within air-filled and tagged regions. The ADC and ADM parameters were optimized by use of an anthropomorphic phantom. The CAD scheme was evaluated with 3232 cases from two types of clinical *ftCTC databases.*

III. SYSTEM MODEL

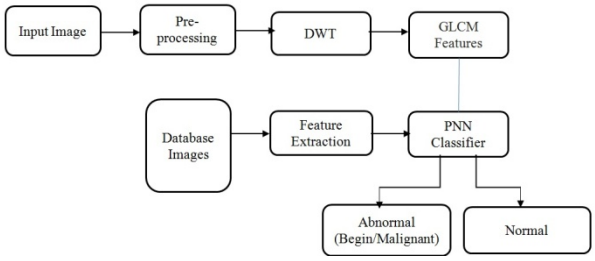

Figure A:Block diagram of system model

Preprocessing:

In this preprocessing stage, the image is enhanced to improve the pixel clarity by removing the unwanted noise. The input image is preprocessed using Adaptive median filter which increase s the gray levels.

Discrete wavelet Transform:-

n numerical analysis and functional analysis, a **discrete wavelet transform** (**DWT**) is any wavelet transform for which the wavelets are discretely sampled. As with other wavelet transforms, a key advantage it has over Fourier transforms is temporal resolution it captures both frequency *and* location information (location in time). The Haar wavelet transform may be considered to pair up input values, storing the difference and passing the sum. This process is repeated recursively, pairing up the sums to prove the next scale, which leads to differences and a final sum.

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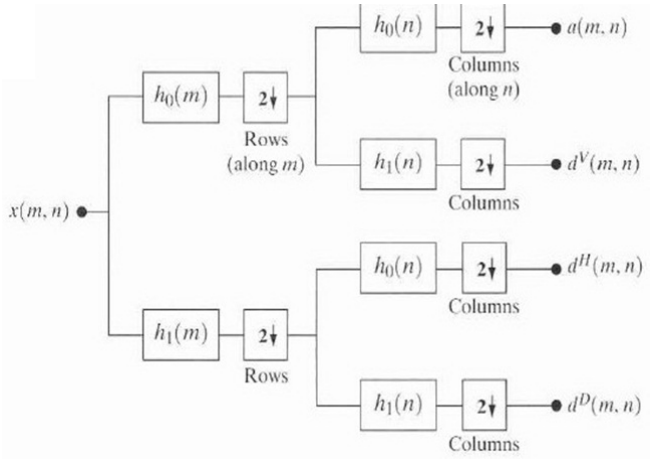

Figure B:Block diagram of DWT

B.Grey Level Cooccurence Matrix

A statistical method of examining texture that considers the spatial relationship of pixels is the grey level co-occurrence matrix (GLCM),also known as the grey-level spatial dependence . After you create the GLCMs using gray comatrix, you can derive several statistics from them using Gray co props. These statistics provide information about the texture of an image. The following table lists the statistics.

0	0	1	1
0	0	1	1
0	2	2	2
2	2	3	3

1a. Test image

Gray tone	0	1	2	3
0	#(0,0)	#(0,1)	#(0,2)	#(0,3)
1	#(1,0)	#(1,1)	#(1,2)	#(1,3)
2	#(2,0)	#(2,1)	#(2,2)	#(2,3)
3	#(3,0)	#(3,1)	#(3,2)	#(3,3)

1b. General form of GLCM

C.Probabilistic neural network (PNN)

A probabilistic neural network (PNN) is a feed forward neural network which is widely used in classification and pattern recognition problems. In the PNN algorithm, the parent probability distribution function (PDF) of each class is approximated by a Parzen window and a non-parametric function. Then, using PDF of each class, the class probability of a new input data is estimated and Bayes' rule is then employed to allocate the class with highest posterior probability to new input data. By this method, the probability of mis-classification is minimized.. In a PNN, the operations are organized into a multilayered feed forward network with four layers:

- Input layer
- .Hidden layer
- Pattern layer/Summation layer
- Output layer

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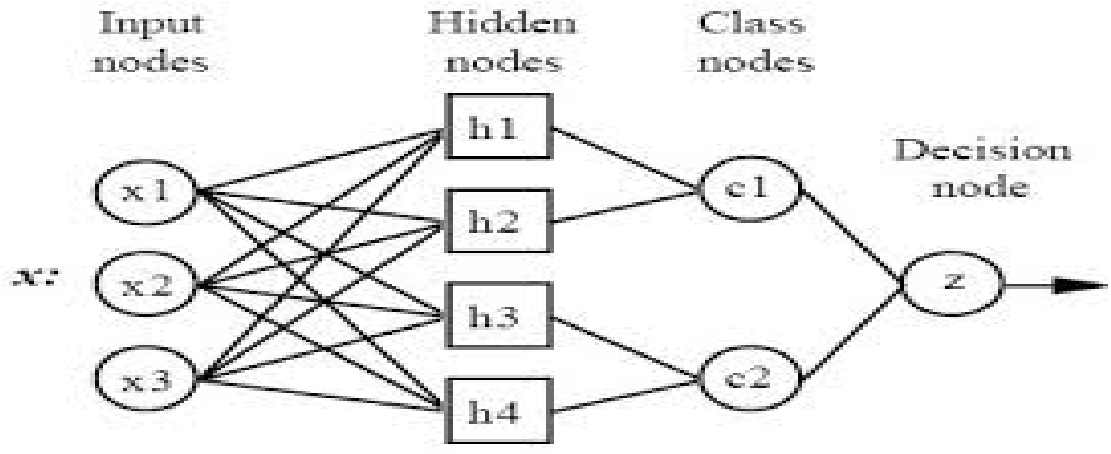
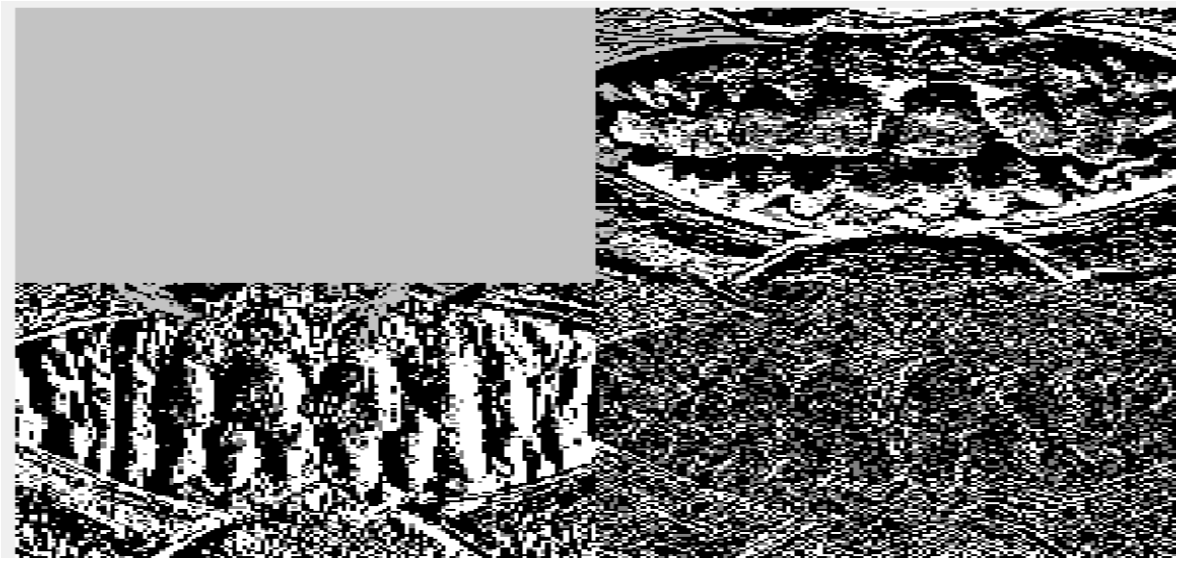
Diagram



PNN is often used in classification problems-When an input is Spresent, the first layer computes the distance from the input vector to the training input vectors. This produces a vector where its elements indicate how close the input is to



the training input. The second layer sums the contribution for each class of inputs and produces its net output as a vector of probabilities. Finally, a compete transfer function on the output of the second layer picks the maximum of these probabilities, and produces a 1 (positive identification) for that class and a 0 (negative identification) for non-targeted classes.

IV. IMPLEMENTATION DETAILS

The proposed system is implemented in Matlab. The command '`uigetfile`' helps to select the corresponding image. Image preprocessing can be done by sresizing of the Iimage parameters.

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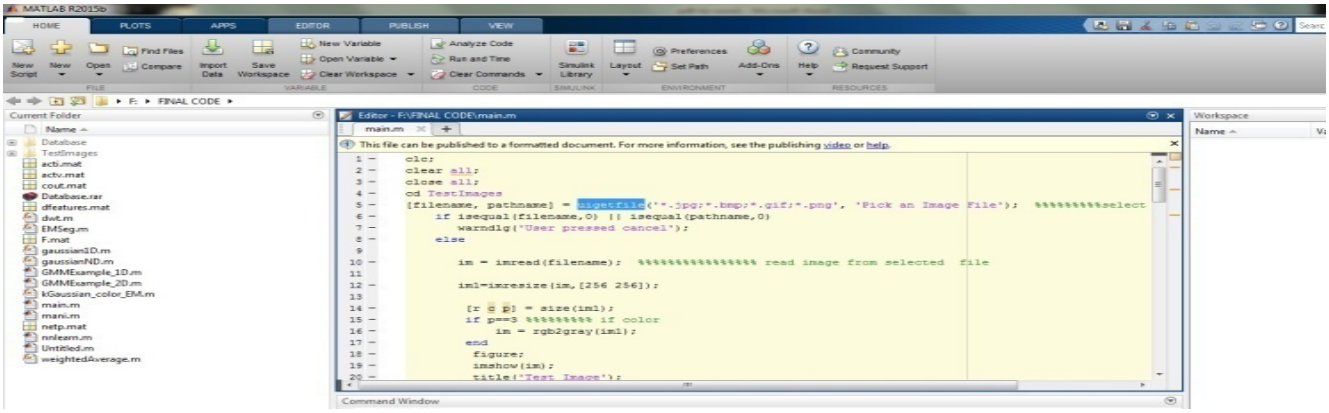

After the fading of input image ,DWT is performed(LL,HH,HL,LH).Then we GLCM algorithm to analyze the image and produces the mathematical results. The results are float in nature. The probability Neural Network is finally results either normal or up normal.

V. RESULT ANALYSIS

By the Results we can analyze the nature of the disesase.At first the Image is given as the input and the following results are obtained,

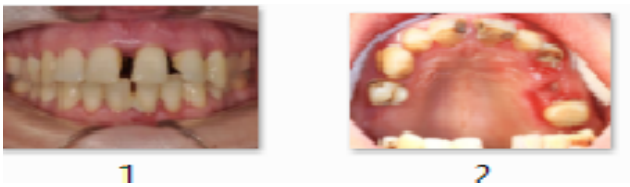

Figure D:Input image

Figure D:GLCM Partitions

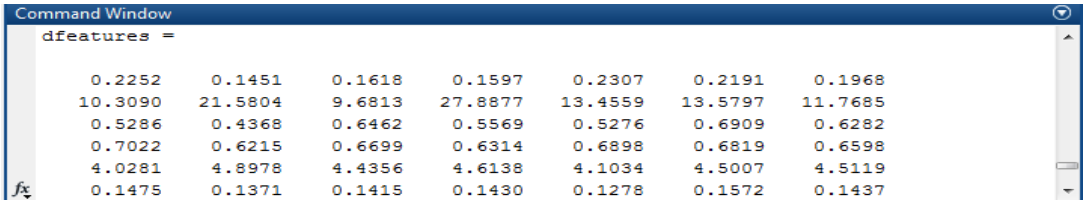

Figure E:feature extraction

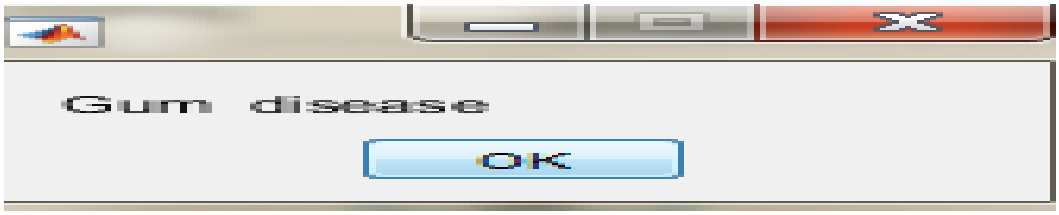

Figure F:final output

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VI. CONCLUSION

In this project ,the oral cancer was detected by using Matlab.
By this project ,the doctor can easily find out the oral cancer without diagnosis and pain And it is cost efficient compare to the traditional method.In addition ,we can easily find the level of the oral cancer.

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