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An Automated Computer Aided Diagnosis System for Liver Images

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ABSTRACT

Image processing plays a vital role in the early detection and diagnosis of Hepatocellular Carcinoma (HCC). In this paper, we present a computational Intelligence based Computer-Aided Diagnosis (CAD) system that helps medical Specialists detect and diagnose the stages of HCC. The proposed CAD comprises. The following stages: image enhancement, liver segmentation, feature extraction and characterization of HCC by means of neural networks. In this project, we Segment the liver tumors by simple linear iterative clustering method. The stage of liver tumours will classify by using neural networks. Initially the liver image is pre-processed by resize, noise removal. The proposed models should be easy to Perform, inexpensive, and give numerical and accurate results in real time. These models predicted the presence of liver images with high accuracy. The system connects with the controller through the Max 232 converter. The LCD will display whether the carcinoma belonged to which stage.

Keywords: Liver Fibrosis Prediction, Hepatitis C Virus, k-means Clustering Algorithm, Neural Network Classifiers.

1. INTRODUCTION

An image is digitized to convert it to a form which can be stored in a computer's memory or on some form of storage media such as a hard disk or CD-ROM. This digitization procedure can be done by a scanner, or by a video camera connected to a frame grabber board in a computer. Once the image has been digitized, it can be operated upon by various image processing operations.

The Image processing operations can be roughly divided into three major categories, Image Compression, Image Enhancement and Restoration, and Measurement Extraction. Image compression is familiar to most people. It involves reducing the amount of memory needed to store a digital image.

2. LITERATURE SURVEY

Noushin R.Farnoud proposed a system, the research explores the possibility of monitoring apoptosis and classifying clusters of apoptotic cells based on the changes in ultrasound backscatter signals from the tissues. The backscatter from normal and apoptotic cells, using a high frequency ultrasound instrument are modelled through an Autoregressive (AR) modelling technique.

Annalisa Berzigotti proposed a system in this LLS are more technically applicable than TE. In patients with clinical suspicion of cirrhosis, LLS is the best non-invasive method to diagnose cirrhosis, while TE is preferable to rule it out. The combination of both holds the best diagnostic accuracy.

Both transient electrography (TE) and left lobe liver surface (LLS) ultrasound may non-invasively detect cirrhosis (LC). It examines the diagnostic value of these methods in patients with a suspicion but not a definite diagnosis of cirrhosis.

3. EXISTING SYSTEM

3.1 Workstation

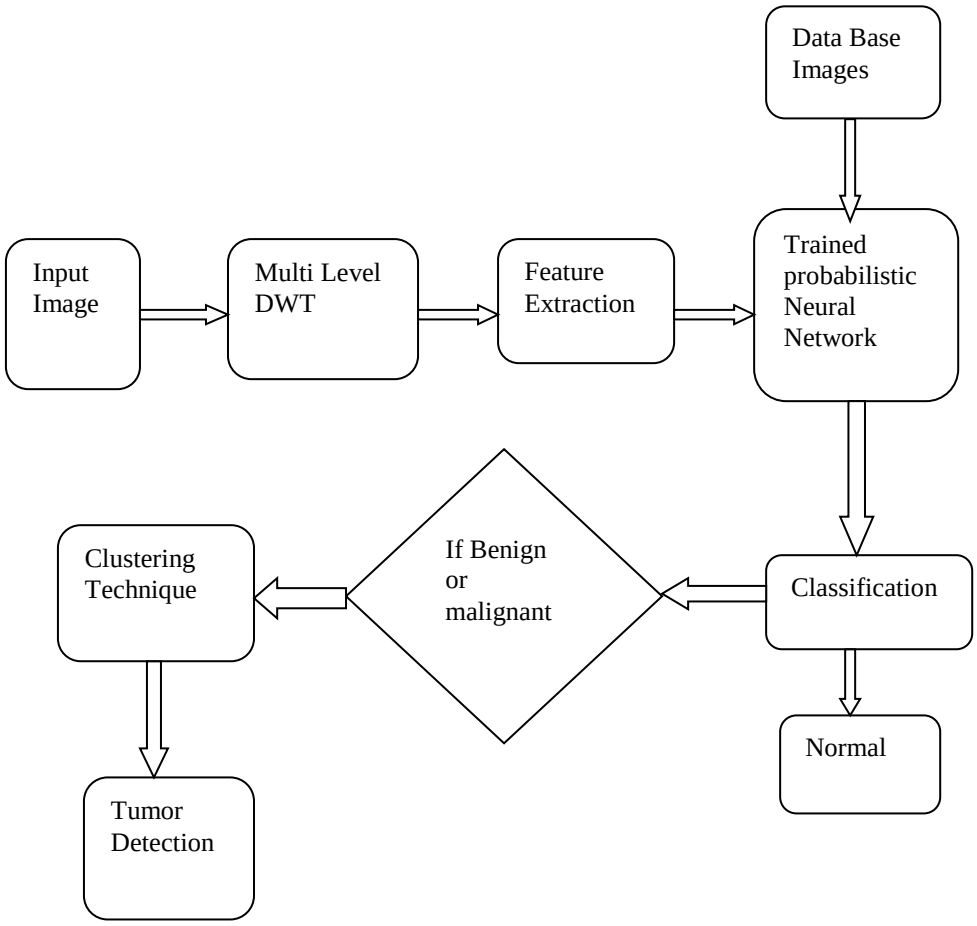

Fig 1: Block diagram

3.2 Demerits

1. Selecting the order of the model is a key problem. Small orders ignore the main and long-term statistical properties of the original signal while larger ones may lead to over fitting effects.
2. It is an invasive and painful procedure , with rare but potentially life-threatening complications.

4. PROPOSED SYSTEM

To develop a computer aided diagnosis system for liver tumour by the combination of image processing and embedded system. To classifying the stage of chronic liver disease to diagnosis early to reduce mortality rate. Using machine learning approaches as non-invasive methods have been used recently as an alternative method in staging chronic liver diseases for avoiding the drawbacks of biopsy.

4.1 Preprocessing

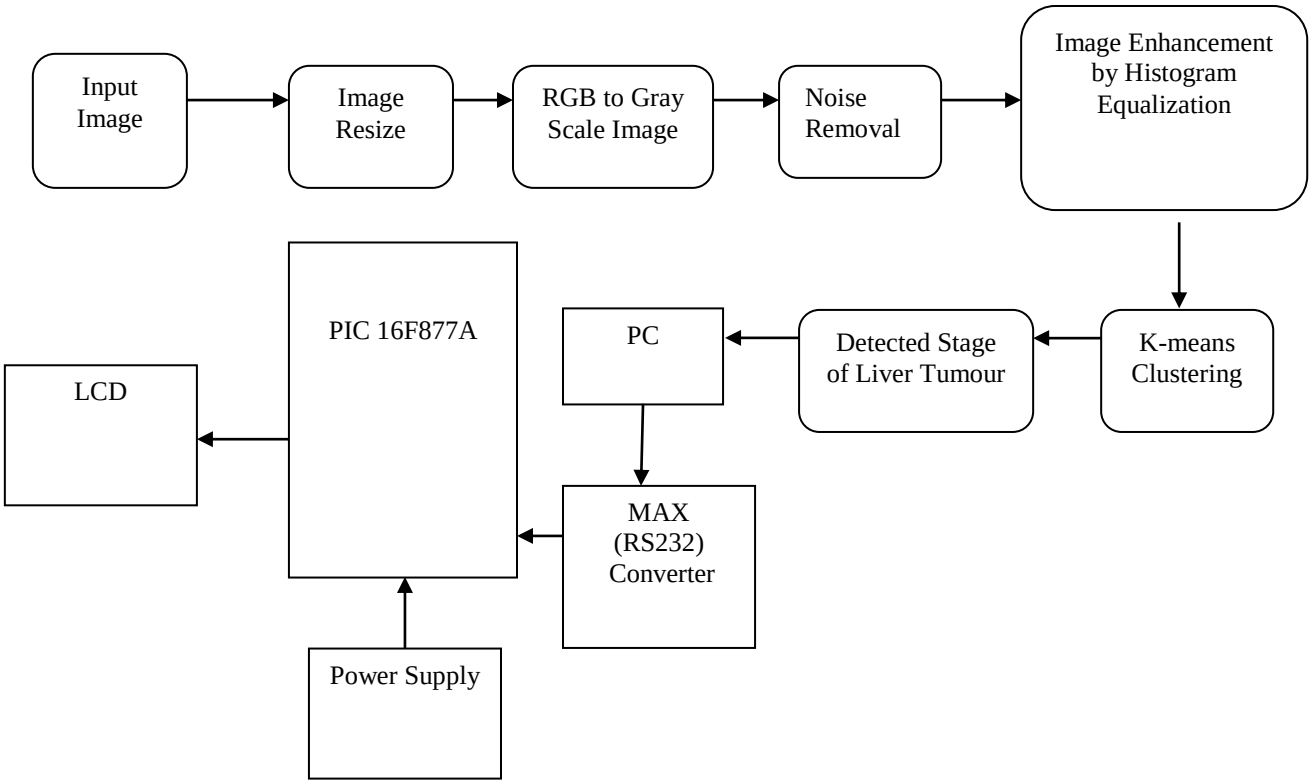

Fig 2: Block diagram

4.2 Image processing

Image processing is referred to processing of a 2D picture by a computer. An image defined in the "real world" is considered to be a function of two real variables, for example, a(x, y) with a as the amplitude (e.g. brightness) of the image at the real coordinate position (x, y).

4.3 Image enhancement

It refers to accentuation, or sharpening, of image features such as boundaries, or contrast to make a graphic display more useful for display & analysis. This process does not increase the inherent information content in data. It includes gray level & contrast manipulation, noise reduction, edge crispening and sharpening, filtering, interpolation and magnification, pseudo coloring, and so on.

4.4 Image restoration

It is concerned with filtering the observed image to minimize the effect of degradations. Effectiveness of image restoration depends on the extent and accuracy of the knowledge of degradation process as well as on filter design. Image restoration differs from image enhancement in that the latter is concerned with more extraction or accentuation of image features.

4.5 Image compression

It is concerned with minimizing the number of bits required to represent an image. Application of compression are in broadcast TV, remote sensing via satellite, military communication via aircraft, radar, teleconferencing, facsimile transmission, for educational & business documents , medical images that arise in computer tomography, magnetic resonance imaging and digital radiology, motion , pictures ,satellite images, weather maps, geological surveys and so on.

4.6 Liquid Crystal Display (LCD)

A liquid crystal display (LCD) is an electro-optical amplitude modulator realized as a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector. It is often utilized in battery-powered electronic devices because it uses very small amounts of electric power.

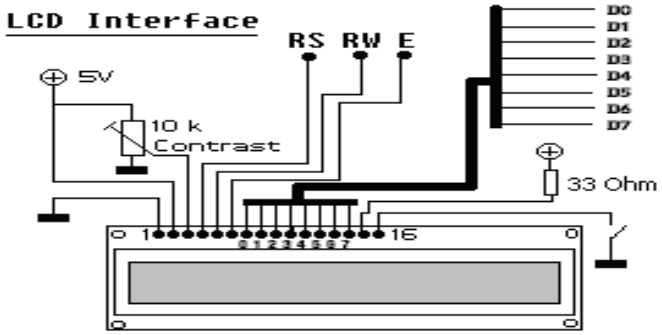

Fig 3: LCD interface

5. RESULT AND DISCUSSION

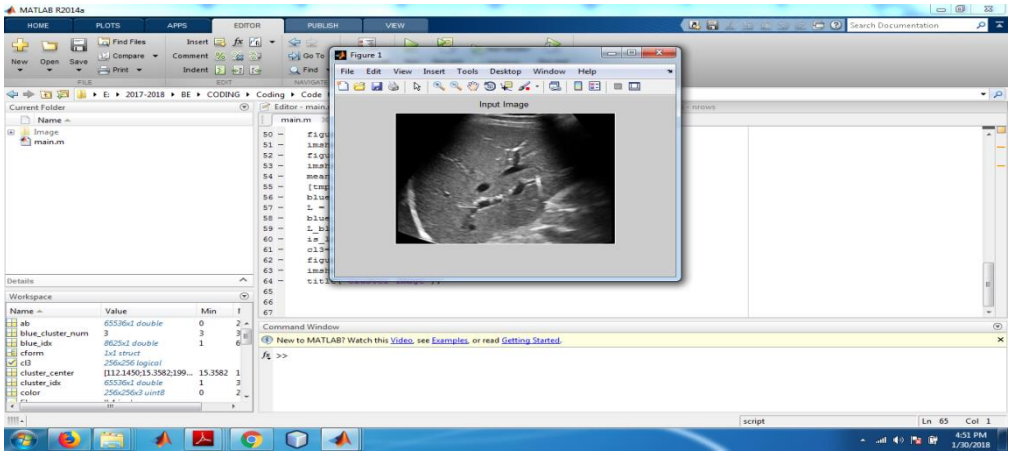

Fig 5: Input image

This figure shows the input image of the liver. This image is given to the PC and then the clustering method can be performed after the image has been given. This input image can be changed to gray scale image. Then it will

process and find the liver tumour stage. The liver image is given as input image. The input image is further preprocessed. In preprocessing image RGB image is converted into gray scale image and then resized.

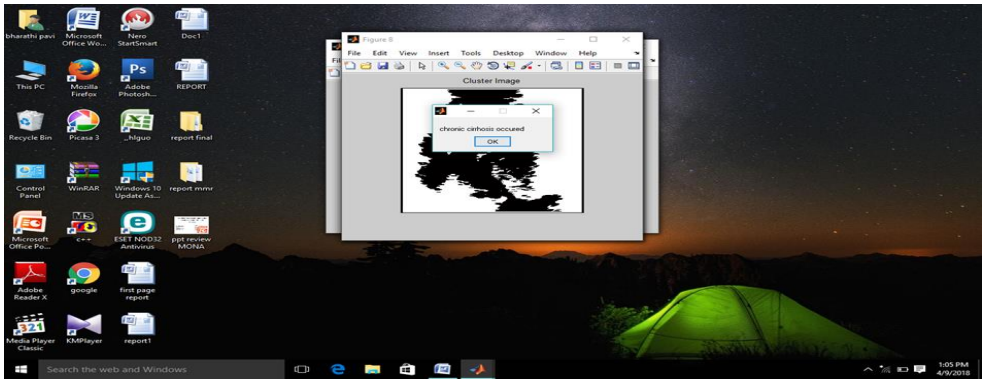

Fig 6: Chronic cirrhosis detected

Fig 7: LCD output

6. CONCLUSION

In this paper a fully automatic CAD system for liver segmentation and liver diagnosis is proposed. The proposed liver segmentation approach is based on K-Means clustering algorithm. Shape and texture features are extracted from in a classification stage using a neural network classifier. Experimental results obtained and that shows our approach gives excellent performance and compares well to other approaches from the literature. We achieve an overall accuracy almost 96% for healthy liver extraction and 97% for liver disease classification.

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REFERENCES

[1] Somaya Hashem, Gamal Esmat, Wafaa Elakel. Comparision of machine learning approaches for prediction advanced liver fibrosis in chronic hepatitis C patients.IEEE Transaction on computational biology and bioinformatics.

[2] Muthukumaran. N and Ravi. R, 'Hardware Implementation of Architecture Techniques for Fast Efficient loss less Image Compression System', Wireless Personal Communications, Volume. 90, No. 3, pp. 1291-1315, October 2016, SPRINGER.

[3] Li Zhang, Qiao-ying LI, Yun-you Duan, Guo-zhen Yan, Yi-lin Yang and Rui-jing Yang. Artificial neural lnetwork aided non-invasive grading evaluation of hepatic fibrosis by duplex ultrasonography. BMC Medical Informatics and Decision Making. 2012; 12:55.

[4] Muthukumaran. N and Ravi. R, 'The Performance Analysis of Fast Efficient Lossless Satellite Image Compression and Decompression for Wavelet Based Algorithm', Wireless Personal Communications, Volume. 81, No. 2, pp. 839-859, March 2015, SPRINGER.

[5] Abdulaziz Q. Alodini. Prevalence of Hepatitis BVirus (HBV) and Hepatitis C Virus (HCV) Infections among Blood Donors at Al-Thwart Hospital Sana'a City-Yemen.Yemeni Journal for Medical Sciences. 2012.

[6] Muthukumaran. N and Ravi. R, 'VLSI Implementations of Compressive Image Acquisition using Block Based Compression Algorithm', The International Arab Journal of Information Technology, vol. 12, no. 4, pp. 333-339, July 2015.

[7] EhabNashaat. Lipid profile among chronic hepatitis C Egyptian patients and its levels pre and post treatment.Nature and Science.2010; 8(7).

[8] Muthukumaran. N and Ravi. R, 'Simulation Based VLSI Implementation of Fast Efficient Lossless Image Compression System using Simplified Adjusted Binary Code & Golumb Rice Code', World Academy of Science, Engineering and Technology, Volume. 8, No. 9, pp.1603-1606, 2014.

[9] Ruban Kingston. M,Muthukumaran. and N, Ravi. R, 'A Novel Scheme of CMOS VCO Design with reduce number of Transistors using 180nm CAD Tool', International Journal of Applied Engineering Research, Volume. 10, No. 14, pp. 11934-11938, 2015.

[10] Dana Crisan, Corina Radu, Mircea Dan Grigorescu Monica Lupsor, Diana Feier, Mircea Grigorescu. Prospective non-invasive follow-up of liver fibrosis in patients with chronic hepatitis C. J Gastrointest Liver Dis. 2012; pp. 375–382.

[11] Muthukumaran. N and Ravi. R, 'Design and analysis of VLSI based FELICS Algorithm for lossless Image Compression', International Journal of Advanced Research in Technology, Vol. 2, No. 3, pp. 115-119, March 2012.

[12] Manoj Kumar. B and Muthukumaran. N, 'Design of Low power high Speed CASCADED Double Tail Comparator', International Journal of Advanced Research in Biology Engineering Science and Technology, Vol. 2, No. 4, pp.18-22, June 2016.

[13] N. Muthukumaran, 'Analyzing Throughput of MANET with Reduced Packet Loss', Wireless Personal Communications, Vol. 97, No. 1, pp. 565-578, November 2017, SPRINGER.

[14] P.Venkateswari, E.Jebitha Steffy, Dr. N. Muthukumaran, 'License Plate cognizance by Ocular Character Perception', International Research Journal of Engineering and Technology, Vol. 5, No. 2, pp. 536-542, February 2018.

[15] Pierre Bedossa, FabriceCarrat. Liver biopsy: the best, not the gold standard. J Hepatology.2009; 50: 1-3.

[16] N. Muthukumaran, Mrs R.Sonya, Dr.Rajashekhara and Chitra V, 'Computation of Optimum ATC Using Generator Participation Factor in Deregulated System', International Journal of Advanced Research Trends in Engineering and Technology, Vol. 4, No. 1, pp. 8-11, January 2017.

[17] Ms. A. Aruna, Ms.Y.Bibisha Mol, Ms.G.Delcy, Dr. N. Muthukumaran, 'Arduino Powered Obstacles Avoidance for Visually Impaired Person', Asian Journal of Applied Science and Technology, Vol. 2, No. 2, pp. 101-106, April 2018.

[18] Mrs. S. Murine Sharmili, Dr. N. Muthukumaran, 'Performance Analysis of Elevation & Building Contours Image using K-Mean Clustering with Mathematical Morphology and SVM', Asian Journal of Applied Science and Technology, Vol. 2, No. 2, pp. 80-85, April 2018.

[19] Keziah. J, Muthukumaran. N, 'Design of K Band Transmitting Antenna for Harbor Surveillance Radar Application', International Journal on Applications in Electrical and Electronics Engineering, Vol. 2, No. 5, pp. 16-20, May 2016.

[20] B.Renuka, B.Sivaranjani, A.Maha Lakshmi, Dr. N. Muthukumaran, 'Automatic Enemy Detecting Defense Robot by using Face Detection Technique', Asian Journal of Applied Science and Technology, Vol. 2, No. 2, pp. 495-501, April 2018.

[21] Ms.Mary Varsha Peter, Ms.V.Priya, Ms.H.Petchammal, Dr. N. Muthukumaran, 'Finger Print Based Smart Voting System', Asian Journal of Applied Science and Technology, Vol. 2, No. 2, pp. 357-361, April 2018.