Research Article

Modified Method Of Diagnosis Of Blood Cancer Using MRI Classification Through Machine Learning

Mr.Ajay Kumar Sharma[1], Dr. Manju Mandot[2]

[1] Research Scholar Mewar University Chittorgarh (Rajsthan) , India, profsharmaak@gmail.com

[2]Director& Professor of Computer Science, JRN Rajasthan Vidhyapeeth Udaipur India, manju.mandot@gmail.com

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Abstract the formation of cancer can attack any organic system of the human body. And talking about the bird look mea that refers to the cancer that affects the blood cells. And as part of blood cancer it rapidly multiplies the cells and attacks the different aspects of the circulatory system. talking about the automatic detection we can detect the cancer that reduce the error and the results obtained from the microscopic images and even by the mistakes that have been occurred by the pathology pathologist that mainly defines the detection of leukemia and as a result. The detection Detection of Leukemia with the help of microscopic images with the help of microscope images as the images are pre processed and the noise is removed as the images are also segmented for the classification to form appropriate structures as it contains the components which is being classified as Eosinophil, Neutrophil, Lymphocyte, Basophil, and Monocytand we have used the back propagation algorithm for the training of the images and the accuracy is achieved is around 85%

1. INTRODUCTION

Leukemia can be defined as the cancer of blood cells the categories are the rbc's the red blood cells, the white blood cells wbcs and the platelets will be starting about leukemia that is mainly the cancer of WBC that is white blood cells Anyone of the 4 things that is Eosinophil, Neutrophil, Lymphocyte, Basophil, and Monocyte and the bone marrow indicates that the cells are influenced because of leukemia.

2 BLOOD CANCER

This cancer is caused because of the dysfunctioning in this cellular growth. The excessive production of the wbc's in the bone marrow when the new white blood cells are regularly generated and the old ones are dying that simply leads to the cancer and this is one of the most common cancers nowadays.

A) Leukemia signs

Leukemia starts because of the blood cells data made inside the bone marrow. As it compels the body to make wbc's that gross out of the bounds and started living longer the signs includes

- Feeling tired and weak.
- Shortness of breath.
- Dizziness
- Pale skin.
- Chest pain

B)**Symptoms includes**

- Fever or chills.
- Persistent fatigue, weakness.
- Frequent or severe infections.
- Losing weight without trying.
- Swollen lymph nodes.
- Easy bleeding or brushing.
- Tiny red spots in your skin.

C)**Causes**

Actually the exact causes still not known. it can be a combination of genetic factors and even the environmental factors that play an important role. The risk includes smoking, ionizing radiation, chemicals, Down syndrome.

3.BASIC KEY TECHNIQUES

A)MRI

It's a revolution in the medical science it mainly refers to magnetic resonance imaging that is imaging strategy that is used to to see the interior structure of the body d and gives high quality images period even it distinguishes among the different tissues in the body .this instrument actually uses powerful magnets that polarize and excite the hydrogen nuclei that is the proton in the water molecules in human tissue. Resulting in the images of the body. MRI images contains a rich source of information like brightness ,, colour, scope size and other features. Along with these the basic aspect is to figure out the computerised images and to manage its texture properties and the good image quality e called as feature extraction. That is basically highlighting the quicker simpler and better aspect to get images.

4. BACK PROPAGATION

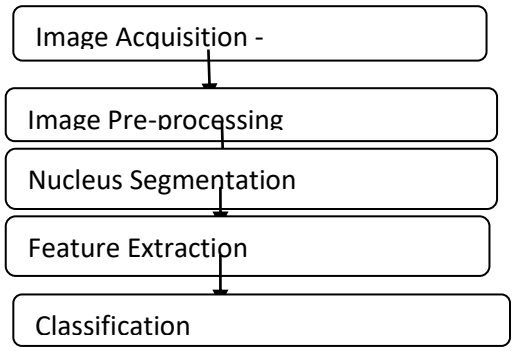
It can be termed as a multilayer feedforward network that is basically used for the classification. This multi layer multiple hidden layers are called nodes or the hidden neurones. The neurones extract the higher order States that consider the external input provided to the network and to the output eventually the k hidden layers are considered in a multilayer perceptron.

In this paper we are using the most common an algorithm that is backpropagation algorithm the Rojas[2005] claim that the BP algorithm that has been broken down to the four major steps and after choosing the base randomly on the network the backpropagation algorithm is used basically to compute the necessary corrections and we have decomposed the algorithm in IV steps:

1. feed forward computation.
2. Back propagation to the output layer.
3. Backpropagation to the hidden layer.
4. Weight updates.

The algorithm is stopped when the value of the error function has been sufficiently smaller enough. This is a very basic formula for the back propagation algorithm and even some variations were being proposed by the scientists but Rojas definition seemed to be more accurate and easy to be followed. The last step of updated weights is been taken for algorithm as a backbone for the completion of the paper.

5. METHODOLOGY OF THE PROPOSED SYSTEM



1**. Image acquisition**

The initial phase of detection of leukaemia through the microscopic MRI starts with the blood images that have been found out at this initial phase the images samples are being taken from the bone marrow by the camera to get the digital data that is used to test the proposed technique. The light being the major key factor that defines the quality and even the clarity of the images therefore talking about the image acquisition the preprocessing of the images having the variety of techniques that will change the domain of the images into another has to be defined in a more appropriate way [8,9]. The spare blood images of around 300 leukaemia influenced patients are considered and 20 normal blood smear images are considered for this particular paper having the images with the maximum resolution pixels and it is in JPG format.

2.Image preprocessing

Transparent of the medical images is one of the most tedious task in the computer aspect in machine learning and image processing as it has to improve the quality of the image and talking about this particular approach is the

improvement and the fluctuations that can be removed by applying and histogram equalization function that means the image is being converted from the RGB to the the h s and v values that defines the correlation between the channels. The hsv full form can be defined as H as hue,S as saturation, V as intensity.

3. Nucleus Segmentation

The intersection of a two-dimensional histogram was being calculated as the number of pixels between all the pairs of the necklace from the truth labels and the inference labels. And this both were calculated as the sum of the pixels that belonged to the labels – their intersection.

4. Feature extraction

It is said as one of the most important and the critical stages of the image processing as it is is involved to extract and identify the features that are being derived from the objects that were meant to be segmented from the parts of the images or the whole. The basic idea has been used because in many applications like for the detection of leukaemia, the character recognition, applications for the credit cards, and data entry etc it has a long run. The basic characteristics of the lymphocyte cell are area perimeter centroid and circulatory. The area of the WBC is calculated firstly and then the nucleus is considered and moving on to the next category is the number of pixels in the WBC nucleus is calculated through the area the circulatory ,eccentricity and solidity.

i. Area – Area is calculated by considering the non-zero pixels and the pixels within the image.
ii. Circularity-It is not having any dimension it keeps changing according to the surface irregularities
iii. Eccentricity-This is a measurement to figure out the deviation of the normal cells from being circular. The value is either 0 or 1
iv. Solidity-It is the density calculation. If the obtained value is less than 1 then the boundaries are irregular.

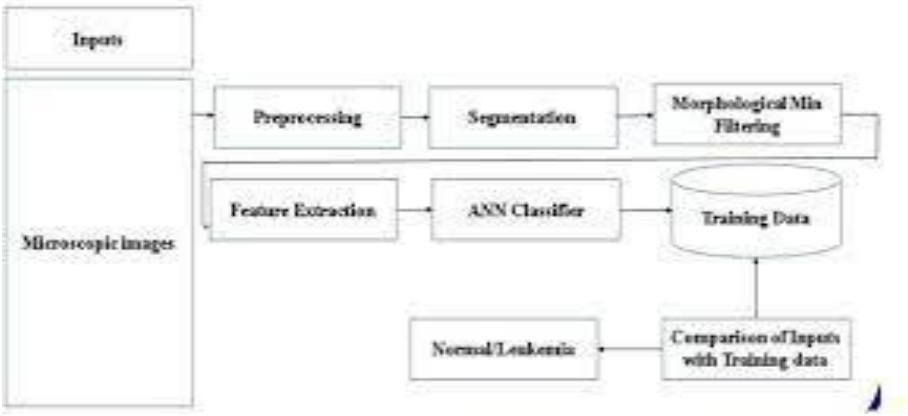


Fig 2: Block diagram of the proposed method I.e. Architecture Diagram Leukemia diagnosis system using MRI dataset

6. IMPLEMENTATION

Following are the steps that are being involved in the algorithm that are being used for the various steps of the diagnosis system the algorithm mainly defines

1. Detection of the abnormality in the retinal fundus images
2. Detecting the abnormalities in Retinal Fundus Images
3. Input: MRI to detect Leukemia
4. Output: Detection of Leukemia influenced cells.
5. Step 1: MRI
6. Step 2: Pre-Processing of the MRI
7. Image enhancement to increase clarity , Filtering to remove the noise
8. Step 3: Segmentation using threshold m
9. Probability of the intensity of the pixel is considered and histogram is computed.
10. Initial values $\omega i= (0)$, $\mu i=(0)$, t
11. For all possible threshold values t=1 ….. maximum

12. Calculate σ2b (t)
13. 1. The threshold obtained corresponds to the maximum value of σ2b (t).
14. Step 4: Calculate Extraction
15. Dynamic shape features to discriminate between false and true characteristic
16. i. Area – Area is calculated by considering the non-zero pixels and the pixels within the image.
17. ii. Circularity-It is not having any dimension it keeps changing according to the surface irregularities iii. Eccentricity-This is a measurement to figure out the deviation of the normal cells from being circular. The value is either 0 or 1
18. iv. Solidity-It is the density calculation. If the obtained value is less than 1 then the boundaries are irregular
19. Step 5: Classification using Back propagation method
20. Extract the bigger cells
21. Extract the smaller cells
22. Classify the cells as per the images
23. If image =’Eosinophil’
24. E=e+1
25. If image = ‘Lymphocyte’
26. L=l+1
27. If image =’Basophil’
28. B=b+1
29. If image =’Neutrophil’
30. N=n+1
31. End
32.

7. RESULT

The result here actually displays the aspect that signifies tht the samples being collected and defined are combining the results that if the value of the count exceeds the provided value then the person is suffering from Leukemia. And talking about the MRI image scanned and features being extracted and the images are segmented in order to detect whether the person is having acute leukemia .This method that we have used is more accurate and even less time consuming

8.CONCLUSION

This Paper studies the design and development of Leukemia diagnosis system. Leukemia is a malignant disease in which abnormal leucocytes is produced. The presence of Eosinophil, Neutrophil, Lymphocyte, Basophil, and Monocyte in the blood test and the bone marrow indicates that the cells are influenced by leukaemia. MRI is pre-processed to remove the noise. Images are segmented to classify the images into appropriate structures. These studies were conducted for the segmentation and detection of acute leukemia by using machine learning techniques. Machine learning techniques may replace blood analysis experts in the detection and classification of leukemia in terms of accuracy and time.

In future work, researchers could focus on other methods of segmenting acute leukemia cells such as using a combination of two or three segmentation techniques to make full use of the different algorithms advantages to achieve better segmentation for the blast cells. In addition, we can suggest using a machine learning algorithm like support vector machine, neural network, and others to improve the segmentation of the blast cell.

REFERENCES

1. X. Chen, Y. Xu, D. W. K. Wong, T. Y. Wong, and J. Liu, “Glaucoma detection based on deep convolutional neural network,” in 2015 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), vol. 37, August 2015, pp. 715–718. https://www.heart.org/-/media/files/about-us/policy-research/fact-sheets/out-of-hospital-cardiac-arrest.pdf?la=enI. K. Elissa, “Title of paper if known,” unpublished.
2. D. Wang, A. Khosla, R. Gargeya, H. Irshad, and A. H. Beck, “Deep Learning for Identifying Metastatic Breast Cancer,” ArXiv e-prints, june 2016https://www.heart.org/-/media/files/about-us/disaster-resources/cardiac-arrest-vs-ucm_493943.pdf?la=en
3. M. Madhukar, S. Agaian, and A. T. Chronopoulos, “Automated screening system for acute myelogenousleukemia detection in blood microscopic images,” IEEE Systems Journal, vol. 8, no. 3, pp. 995–1004, 2014.

4. J. Kawahara and G. Hamarneh, Multi-resolution-Tract CNN with Hybrid Pretrained and Skin-Lesion Trained Layers. Springer International Publishing, 2016. /
5. Krizhevsky, I. Sutskever, and G. E. Hinton, "Imagenet classification with deep convolutional neural networks," in Advances in Neural Information Processing Systems 25, F. Pereira, C. J. C. Burges, L. Bottou, and K. Q. Weinberger, Eds. Curran Associates, Inc., 2012, pp. 1097– 1105
6. Ravichandran K. S. and Ananthi B. (2009), Color Skin Segmentation using K–Means Cluster. International Journal of Computational and Applied Mathematics, Vol. 4, No.2, pp.153 – 157
7. A. El-Nasser, M. Shaheen, and H. ElDeeb, "Enhanced leukemia cancer classifier algorithm," in Science and Information Conference (SAI), 2014, 2014, pp. 422–429..
8. Maru, A. K. Sharma and M. Patel, "Hybrid Machine Learning Classification Technique for Improve Accuracy of Heart Disease," 2021 6th International Conference on Inventive Computation Technologies (ICICT), Coimbatore, India, 2021, pp. 1107-1110, doi: 10.1109/ICICT50816.2021.9358616.
9. S. S. Al-jaboriy, N. N. A. Sjarif, S. Chuprat, and W. M. Abduallah, "Acute Lymphoblastic Leukemia Segmentation Using Local Pixel Information," Pattern Recognit. Lett., 2019.
10. Su, J., Liu, S., & Song, J. (2017). A segmentation method based on HMRF for the aided diagnosis of acute myeloid leukemia. Computer Methods and Programs in Biomedicine, 152, 115–123
11. K. C. Giri, M. Patel, A. Sinhal and D. Gautam, "A Novel Paradigm of Melanoma Diagnosis Using Machine Learning and Information Theory," 2019 International Conference on Advances in Computing and Communication Engineering (ICACCE), Sathyamangalam, India, 2019, pp. 1-7, doi: 10.1109/ICACCE46606.2019.9079975.
12. Rawat, J., Bhadauria, H. S., Singh, A., & Virmani, J. (2015). Review of leukocyte classification techniques for microscopic blood images. In Computing for Sustainable Global Development (INDIACom), 2015 2nd International Conference on (pp. 1948–1954). IEEE.
13. Francis, E. U., Mashor, M. Y., Hassan, R., & Abdullah, A. A. (2011). Screening of bone marrow slide images for leukemia using multilayer perceptron (MLP). In Industrial Electronics and Applications (ISIEA), 2011 IEEE Symposium on (pp. 643–648). IEEE.
14. Rodenacker K, Bengtsson E. A feature set for cytometry on digitized microscopic images. Anal Cell Pathol 2003;25:1