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Blood Cancer Detection Using Machine Learning

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Abstract: Leukemia (blood cancer) begins in the bone marrow and causes the formation of a large number of abnormal cells. The most common types of leukemia known are Acute lymphoblastic leukemia (ALL), Acute myeloid leukemia (AML), Chronic lymphocytic leukemia (CLL) and Chronic myeloid leukemia (CML). This project makes an effort to devise a methodology for the detection of Leukemia using image processing techniques, thus automating the detection process. Our project consist of development of a machine learning algorithm to detect cancer using microscopy image.

Keywords: Machine Learning, Blood Cancer, Leukemia, Image Processing, CNN Architecture

I. INTRODUCTION

Cancer is a fatal illness often caused by genetic disorder aggregation and a variety of pathological changes. Cancerous cells are abnormal areas often growing in any part of human body that are life-threatening. Even though modality has different considerations, such as complicated history, improper diagnostics and treatment that are main causes of deaths. The aim of is to analyse, review, cancer detection using machine learning techniques for cancer leukemia. The study highlights how cancer diagnosis, cure process is assisted using machine learning with supervised, unsupervised and deep learning techniques.

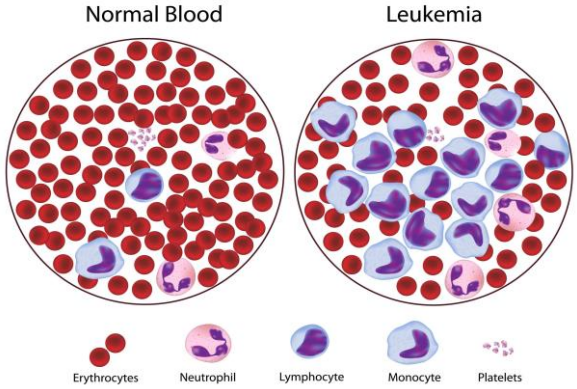

Figure 1 : Blood Sample

Right side sample consist of abnormally grown white blood cells. These distinct features can be used in detection of leukemia by machine learning module.

Microscopic blood tests are considered as the main procedure for the diagnosis of leukemia. Analysis of blood smears is the most common way of discovering leukemia, but not the only one technique. Interventional radiology is an alternative technique for the diagnosis of leukemia. However, radiological techniques, such as percutaneous aspiration, biopsy, and catheter drainage, suffer from inheriting limitations of imaging modality sensitivity and resolution of the radio images. Moreover, other techniques, such as Molecular Cytogenetics, Long Distance Inverse Polymerase Chain Reaction (LDI-PCR), and Array-based Comparative Genomic Hybridization (aCGH), need extensive work and time to identify leukemia types. Due to time and cost requirements of these techniques, microscopic blood tests and bone marrow are the most common methods for identification of leukemia subtypes.

II. LITERATURE REVIEW

- Raghav Kandhari, Anupama Bhan, Parth Bhatnagar shows Computer based diagnosis of Leukemia in blood smear images Shows blood images using image processing.
- Patil Babaso S, S.K. Mishra, Aparna Junnarkar illustrates Leukemia Diagnosis Based on Machine Learning Algorithms.

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- N. H. M. Daud, R. A. A. Raof, M. K. Osman, N. H. Harun describes Segmentation Technique for Nucleus Detection in Blood Images for Chronic Leukaemia.
- Dharani T, Hariprasath S will shows the Diagnosis of Leukemia and its types Using Digital Image Processing Techniques.
- Atharva Bankar, Kewal Padamwar, and Aditi Jahagirdar calculates Symptom Analysis using a Machine Learning approach for Early Stage Lung Cancer.
- Subhash Rajpurohit Sanket Patil Nitu Choudhary, Shreya Gavasane Prof. Pranali Kosamkar describes . Identification of Acute Lymphoblastic Leukemia in Microscopic Blood Image Using Image Processing and Machine Learning Algorithms.
- Astha Ratley Mrs, Jasmine Minj Mrs, Pooja Patre illustrates Leukemia Disease Detection and Classification Using Machine learning Approaches
- Saif Ali, Sai fur Rehman, Aneeqa Tamveer, Azhar Hussain presents Identification of cancer disease using image-processing approaches.
- Naresh Khuriwal, Nidhi Mishra predicts Breast Cancer Detection From Histopathological Images Using Deep Learning.
- Mobeen-ur-Rehman , Sharzil Haris Khan, Zeeshan Abbas , S.M. Danish Rizvi describes Classification of Diabetic Retinopathy Images Based on Customised CNN Architecture.
- Amjad Khana , Zahid Ansari shows Identification of Lung Cancer Using Convolutional Neural Networks Based Classification.
- Ravva Sai Sanketh, Dr. M Madhu Bala, Panati Viswa Narendra Reddy, G V S Phani Kumar presents Melanoma Disease Detection Using Convolutional Neural Networks.
- Mohammad Akter Hossain, Mubtasim Islam Sabik illustrates . Leukemia Detection Mechanism through Microscopic Image and ML Techniques.
- Deepika Kumar, Nikita Jain describes Automatic Detection of White Blood Cancer from Bone Marrow Microscopic Images Using Convolutional Neural Networks.
- Supriya Mandal, Vani Daivajna illustrates Machine Learning based System for Automatic Detection of Leukemia Cancer Cell.
- Preeti Jagadev, Dr. H.G. Viran presents Detection of Leukemia and its Types using Image Processing and Machine Learning.
- Ramesh , Prashanth P, Sampath Kumar illustrated the python programming for the detection of blood cancer and project deployment.
- N.H.Abd Halim; M.Y. Mashor shows Nucleus segmentation technique for acute Leukemia using convolutional neural network.
- Adnan KhashmanHayder Hassan Abba illustrated the method of Acute Lymphoblastic Leukemia Identification Using Blood Smear Images and a Neural Classifier.
- Himali P. Vaghela describes Leukemia Detection using Digital Image Processing Techniques for leukimia project deployment.

III. METHODOLOGY

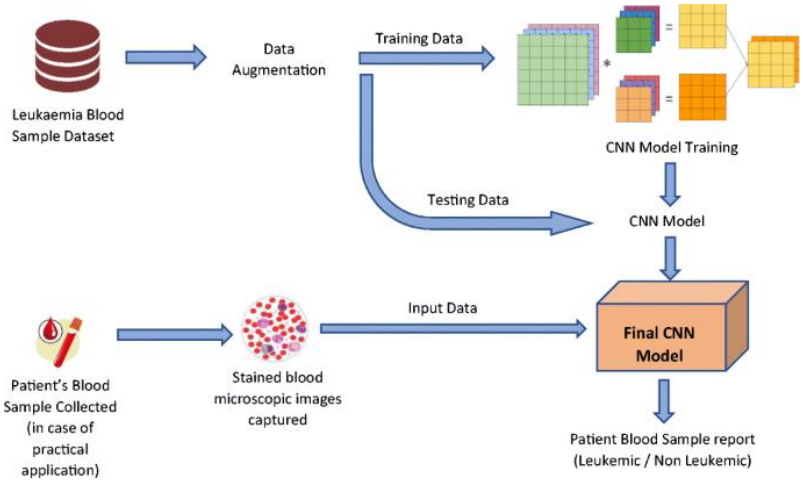

Figure 2 : Block diagram of blood cancer detection using ML

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For training the module 1000's of images of cancerous and non cancerous sample are collected and stored in a file. The file is divided into two parts training datasets and testing data sets training data sets is used to train the machine learning module .It consists of cancerous and non cancerous images labelled respectively. These images will be fed into machine learning module, and trained module is extracted.

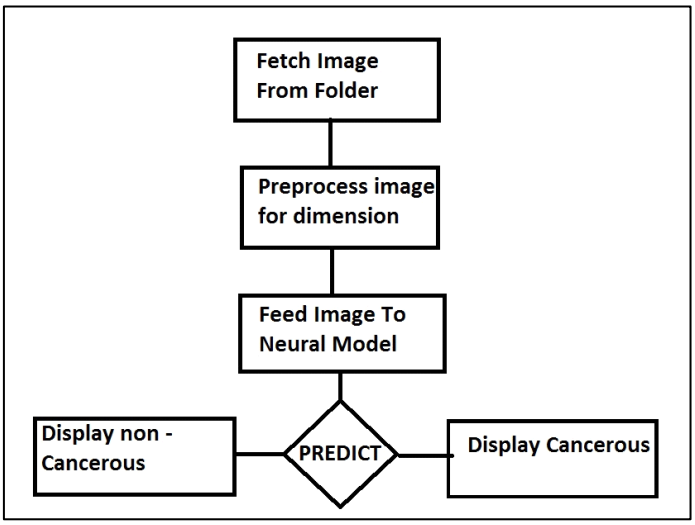

Figure 3 : Diagnosis of Leukemia

The diagnosis of cancer starts with the collection of blood sample at the laboratory, the microscopy image is then passed into trained neural module for diagnosis. The trained machine learning module will give output whether the sample is cancerous or non cancerous based on prediction value.

For training the module 1000's of images of cancerous and non cancerous sample are collected and stored in a file. Training data sets is used to train the machine learning module. It consists of cancerous and non cancerous images labelled respectively. These images will be fed into machine learning module, and trained module is extracted. The neural machine learning module is created using keras library and python in google collab editor .

IV. CONCLUSION

Due to modern lifestyle, pollution and other factors cancer is becoming more of common disease. With conventional methods of detection of cancer takes time because transport of sample tissue (biopsy) to a cancer diagnosing facility ,since cancer is fast spreading disease early treatment will likely increase the chances of survival of cancer patient. With the help of machine learning ,results are fast and accurate which helps in early detection and also the diagnosing process can be done at low cost.

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