

Leukemia Cancer Cells Segmentation and Classification using Machine Learning

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Abstract: *Determining the aim of the project is to detect the leukemia at earlier stage with the help of image processing techniques. Leukemia means blood cancer which is featured by the uncontrolled and abnormal production of white blood cells (leukocytes) by the bone marrow in the blood. Acute Lymphoblastic Leukemia (ALL) is a type of leukemia which is more common in children. The term "Acute" means that leukemia can progress quickly and if not treated may lead to fatal death within few months. Due to its non specific nature of the symptoms and signs of ALL leads wrong diagnosis. Even hematologist finds it difficult to classify the leukemia cells, there manual classification of blood cells is not only time consuming but also inaccurate. Therefore, early identification of leukemia yields in providing the appropriate treatment to the patient. Detection through images is fast and cheap method as there is no special need of equipment for lab testing. We have focused on the changes in the geometry of cells like area, perimeter and statistical parameters like mean and standard deviation which separates white blood cells from other blood components using processing tools like MATLAB. After recognizing its statistical properties, types of leukemia will be identified based on the irregularities in the shape.*

Keywords: Acute Lymphoblastic Leukemia

I. INTRODUCTION

Hexaware Solutions:

Hexaware Solutions is a company based in Chennai, India, that specializes in providing solutions and services in the field of embedded systems, Internet of Things (IoT), and electronics. It's important to note that details about companies can change over time, and it's advisable to check the latest information from reliable sources or the company's official website.

Hexaware Solutions was known for offering a range of products and services related to embedded systems and electronics, including development boards, kits, components, and training programs. They catered to educational institutions, research organizations, and industries seeking solutions in embedded technology.

Company offers best software training and placement exclusively on Python, Oracle, Selenium, Amazon Web Services(AWS), Data Warehouse, Java, Sharepoint, Software Testing, Informatica, Blockchain, Dot Net, Oracle DBA, Hadoop, SAS, R Language, Tableau, Power BI, Xamarin, Node.js, ReactJS, UNIX SHELL Scripting, C and C++, and more to the students.

Hexaware Solutions is a leading Training and Placements company in Chennai. We are known for our practical approach towards trainings that enable students to gain real-time exposure on competitive technologies. Trainings are offered by employees from MNCs to give a real corporate exposure.

We undertake **Classroom Training, Corporate Training and Video Based Training** on latest Technologies on latest versions. We make sure that all our sessions are very much interactive and well structured. We encourage every participant to come up with his / her own queries during & after the training sessions. We prefer practical approach rather than theoretical information to master the technical depth of the technology. We provide excellent Lab

Handouts for practice including Realtime Case Studies and Projects on ALL courses. Specific **DAY to DAY Course Plan** will also be shared prior to training registration to ensure transparency of our Training services.

Our Trainings are focused on perfect improvement of technical skills for Freshers and working professional. Our Training classes are sure to help the trainee with **COMPLETE PRACTICAL TRAINING** and Realtime methodologies.

II. LITEATIRE SURVEY

1. Assessment of Tumor Invasion Depth in Leukemia Carcinoma Using Multiphoton Microscopy **Shu Wang; Jianxin Chen; Yinghong Yang; Weizhong Jiang; Changyin Feng; Guoxian Guan; Shuangmu Zhuo; Zhifen Chen**

Publisher: IEEE 2023

Assessment of tumor invasion depth prior to making therapeutic decisions in Leukemia carcinoma is crucial for both the patient and the physician. In this paper, multiphoton microscopy (MPM) was used to simultaneously label freely image loose areolar connective tissue in the submucosa and intramuscular septa in the muscularispropria to perform assessment of Leukemia carcinoma invasion depth.[1] The results indicated that MPM can accurately exhibit whether Leukemia carcinoma invades into the submucosa or the muscularispropria.[3] Collagen content alteration and the presence of dirty necrosis can be extracted to serve as quantitatively intrinsic biomarkers for reflecting collagen degradation, the occurrence of desmoplastic reaction, and breakdown of cancer cells, which are tightly related to the prognosis of Leukemia carcinoma. With the development and clinical applications of the multiphoton endoscope, in vivo histological-like diagnosis of tumor invasion depth may become its main application in the field of Leukemia carcinoma and lead to faster and improved therapeutic decision making in the clinics.

2. LeukemiaTumor Segmentation of CT Scans Based on a Convolutional Neural Network With an Attention Mechanism **Yun Pei; Lin Mu; Yu Fu; Kan He; Hong Li; ShuxuGuo; Xiaoming Liu; Mingyang Li; Huimao Zhang; Xueyan Li**

Publisher: IEEE 2023

Due to the irregularity of Leukemiatumor contours, it is a challenging task for clinicians to segment Leukemiatumors manually in CT scans[2] To solve this problem, a novel algorithm based on a convolutional neural network with an attention mechanism is proposed to automatically achieve tumor segmentation. The proposed network consists of three major modules: an encoder module, which is fed CT[4] scans to attain the feature map; a dual attention module, which includes a channel attention module and a position attention module to obtain more contextual information in the deep layer of the network; and a decoder module, which restores the feature map to the original size of the input images. We used 1131 CT slices of Leukemiatumors to train and test the proposed network. Compared with U-Net and CE-Net.[5] the Dice coefficient increased by 1.46% and 0.66% respectively, for our model[6]. The comprehensive results show that the proposed network performs more effectively in Leukemiatumor segmentation than the other methods[10]

III. SYSTEM STUDY

FEASIBILTY STUDY

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.

The feasibility study investigates the problem and the information needs of the stakeholders. It seeks to determine the resources required to provide an information systems solution, the cost and benefits of such a solution, and the feasibility of such a solution. The analyst conducting the study gathers information using a variety of methods, the most popular of which are:

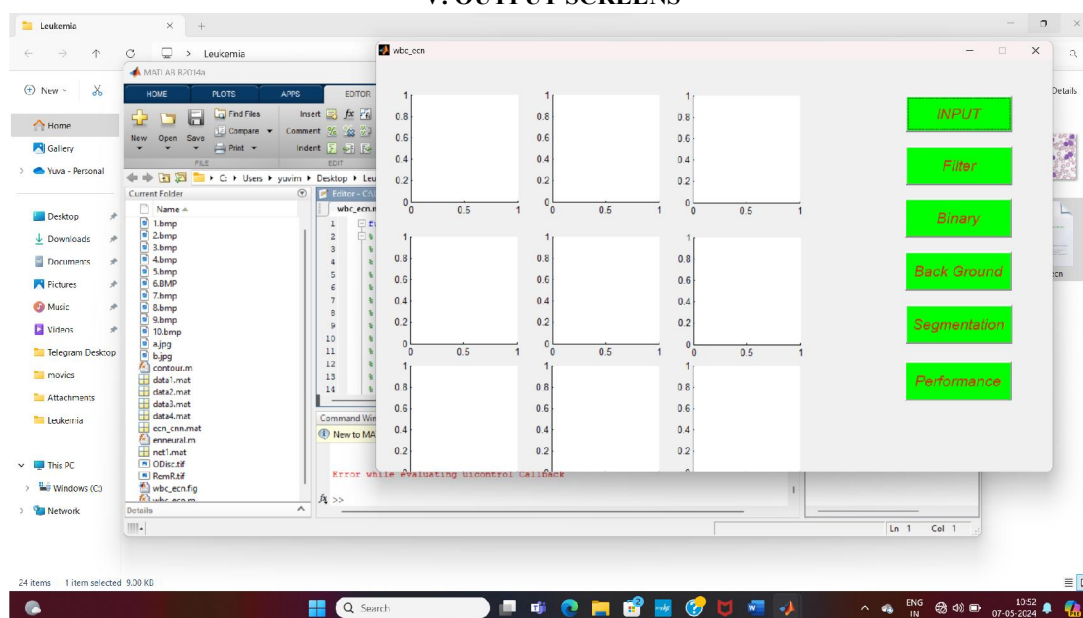
- Developing and administering questionnaires to interested stakeholders, such as potential users of the information system.
- Observing or monitoring users of the current system to determine their needs as well as their satisfaction and dissatisfaction with the current system.
- Collecting, examining, and analyzing documents, reports, layouts, procedures, manuals, and any other documentation relating to the operations of the current system.
- Modeling, observing, and simulating the work activities of the current system.

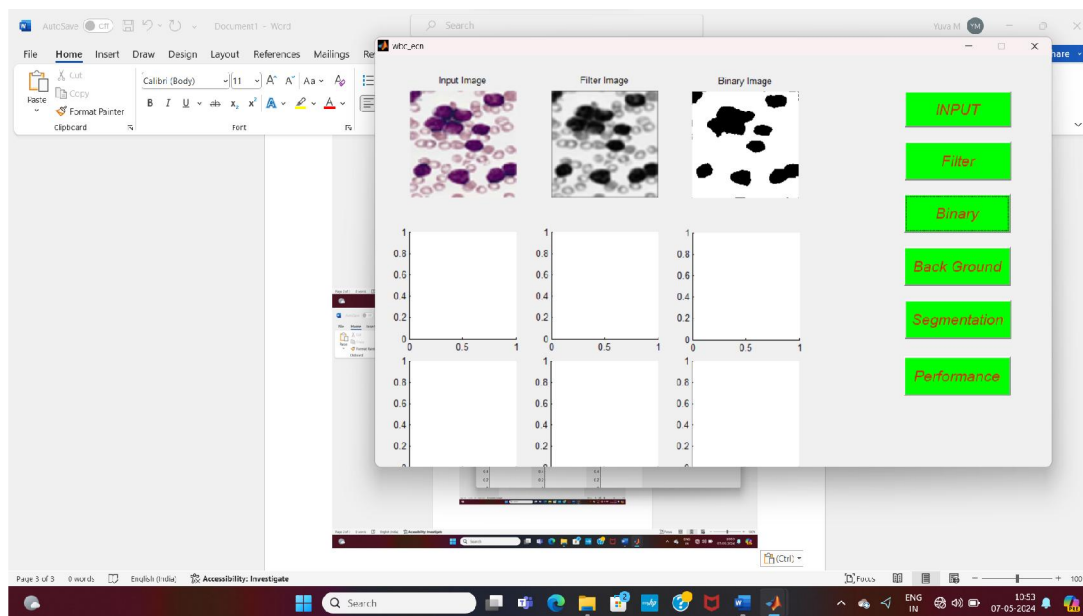
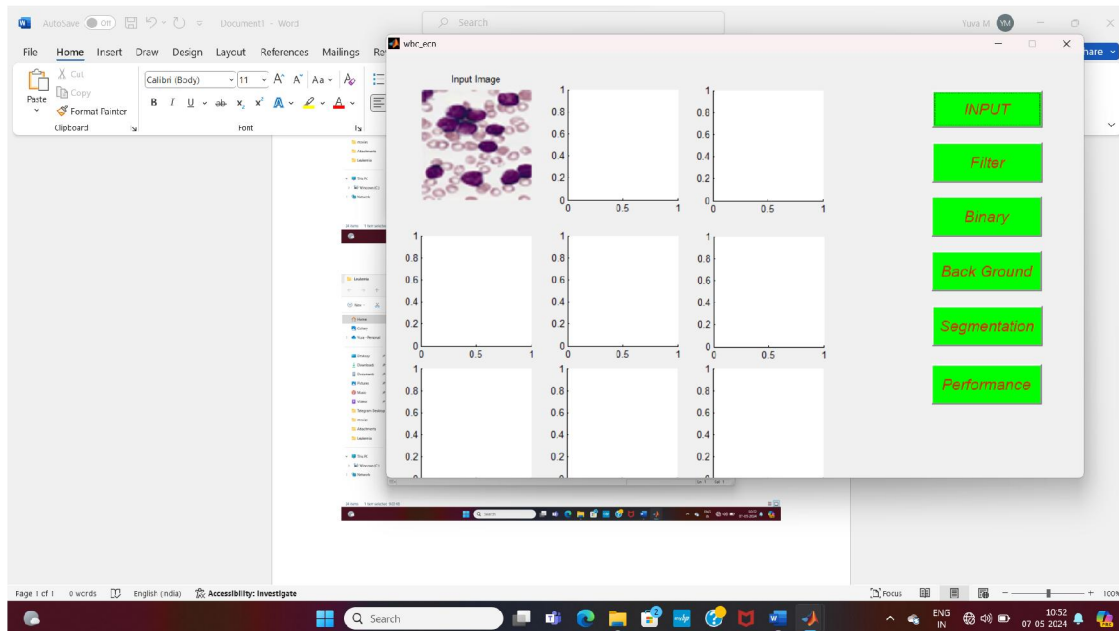
IV. SYSTEM REQUIREMENTS

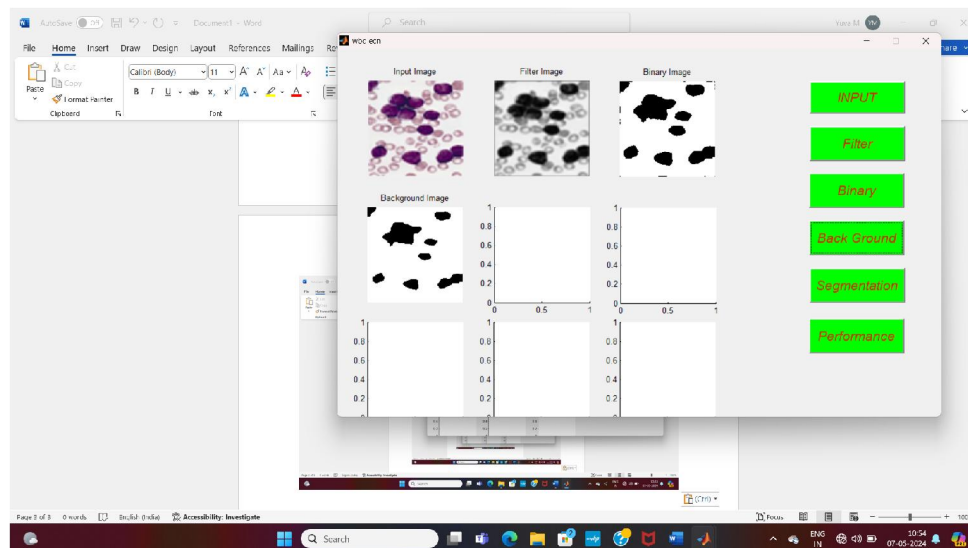
If you are new to MATLAB, you should start by reading Manipulating Matrices. The most important things to learn are how to enter matrices, how to use the: (colon) operator, and how to invoke functions. After you master the basics, you should read the rest of the sections below and run the demos.

At the heart of MATLAB is a new language you must learn before you can fully exploit its power. You can learn the basics of MATLAB quickly, and mastery comes shortly after. You will be rewarded with high productivity, high-creativity computing power that will change the way you work..

V. OUTPUT SCREENS







VI. CONCLUSION

This project demonstrates the modeling of Leukemia cancer as classification task and describes the implementation of ML approach for classifying Leukemia cancer as either benign or malignant. The results of ML were compared on the basis of accuracy with existing system. It was observed that classification implemented by ML technique in this project is more efficient compared to existing algorithms as seen in the accuracy and precision. Based on the results, ML technique is more efficient compared to other existing methods technique in Leukemia cancer detection.

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