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LUNG CANCER STAGES PREDICTION

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ABSTRACT:

The identification of lung cancer at the early stage is very demanding and difficult task due to construction of the cell. The cancer grows in the body when cancerous cells start to develop uncontrollably. The image processing plays vital role in the prediction of lung cancer at early stage which is also helpful in treatment to avoid the lung cancer. This proposed system is developed to detect lung cancer at early stage with the help of image processing techniques and artificial neural network classifier to design computer based diagnosis system. In this system, during the preprocessing step, several image enhancing techniques, masks are applied using morphological operations and thresholding technique, which eliminates background and surrounding tissue. Region of interest (ROI) is calculated using region based segmentation algorithm. Circle fit algorithm is used to extract the desired nodule. Radius, Mean Intensity, Area, Euler Number and ECD features are extracted in feature extracting step. Finally, Back propagation algorithm is used to train Artificial Neural Network (ANN) in categorization stage.

Keywords: ROI, ECD, ANN, AI, Cancer

INTRODUCTION

The main cause of lung cancer is growth of cells in lung tissue which is irregular and out of control. One of the reasons is smoking. If it is detected earlier, then there will be a good chance of curing. Screening is the one of the important step for lung cancer detection. Screening is the process used to detect and identify the nodule. A nodule appear as round and white in co lour on a Co mputed Tomography scans images or an chest X-

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ray.[1] There are two types of nodules one is a benign and second one is

a

malignant. A nodule with diameter 3 cm or less is called a Pulmonary or non-cancerous nodule. These nodules are also called as benign. A nodule whose diameter is larger than 3 cm is poisonous and called as malignant nodule. Malignant nodule should be identified as early possible because it is likely to be cancerous nodule. To check whether these nodules are expanding, they are needed to be observed over the time. If there is a change in the size of nodule and it is growing then there is a probability of getting cancer. So, a nodule should be observed. [2] As compared with other types of cancer, the long term endurance rate of lung cancer patient is very lo w. So, the identification of lung cancer at early stage is very important and it provides vital research platform in med ical image processing field.

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LITERATURE SURVEY

Lung Nodule Detection Using Image Segmentation Methods, AUTHOR: Nanusha

The detection and segmentation of lung nodules based on computer tomography images (CT) is a basic and significant step to achieve the robotic needle biopsy. In this paper, we reviewed some typical segmentation algorithms, including thresholding, active contour, differential operator, region growing and watershed. To analyse their performance on lung nodule detection, we applied them to four CT images of different kinds of lung nodules. The results show that thresholding, active contour and differential operator do well in the segmentation of solitary nodules, while region growing has an advantage over the others on segmenting nodules adhere to vessels. For segmentation of semi-transparent nodules, differential operator is an especially suitable choice.

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Watershed can segment nodules adhere to vessels and semi-transparent nodules well, but it has low sensitivity in solitary nodules

Segmentation and Image Analysis of Abnormal Lungs at CT: Current Approaches, Challenges, and Future Trend AUTHOR: Awais Mansoor Ph.D et al,

Our aim is to review and explain the capabilities and performance of currently available approaches for segmentation of lungs with pathologic conditions on chest CT images, with illustrations to give radiologists a better understanding of potential choices for decision support in everyday practice. The computer-based process of identifying the boundaries of lung from surrounding thoracic tissue on computed tomographic (CT) images, which is called segmentation, is a vital first step in radiologic pulmonary image analysis. Many algorithms and software platforms provide image segmentation routines for quantification of lung abnormalities; however, nearly all of the current image segmentation approaches apply well only if the lungs exhibit minimal or no pathologic conditions. When moderate to high amounts of disease or abnormalities with a challenging shape or appearance exist in the lungs, computer-aided detection systems may be highly likely to fail to depict those abnormal regions because of inaccurate segmentation methods.

EXISTING SYSTEM :

The important step in the identification of lung cancer is detection of nodule. Image enhancement pre-processing is done again before extracting desired nodules. The image boundary connected objects are cleared. The gray thresholding for b inarizat ion, image background techniques are used for image pre-processing. Reg ion based algorith m is used to segment the nodules from lung. Nodule with area between 75 p ixels and 1000 p ixe ls is identified and segmented for further process

PROPOSED SYSTEM :

The median filter is generally used to diminish noise in an image. In the image, the median filter checks its nearby pixel to decide whether that neighbouring pixel is similar or not. In this filter it replaces pixel value with its neighbouring median pixel values. Histogram equalization technique is used to adjust image intensity to enhance contrast. It is the

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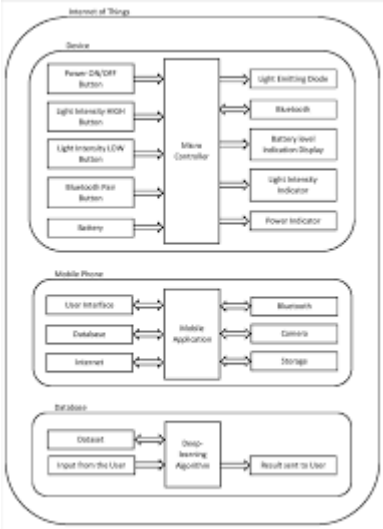
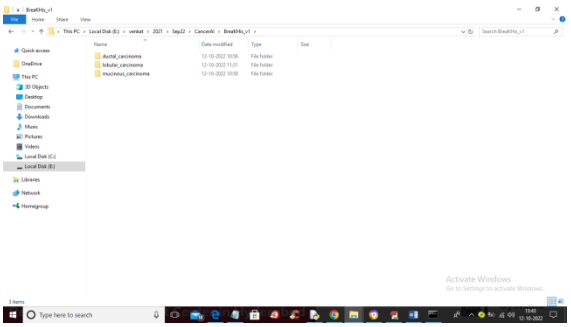
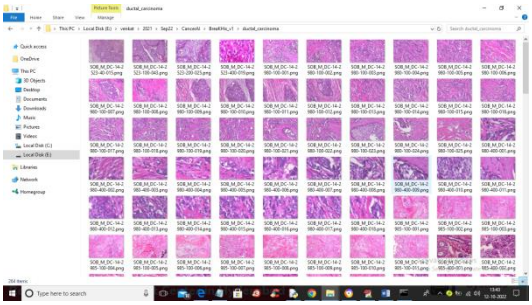
graphical interpretation of the image's pixel intensity values. It can be interpreted as the data structure that stores the frequencies of all the pixel intensity levels in the image.



In this project we are implementing Artificial Intelligence algorithm called as Neural Networks with various optimizer techniques such as ADAM, SGD and Gradient Descent Mini Batch to predict cancer disease. To train AI algorithms we have used images given by you and this images contains 3 different types of cancer or stages and below screen showing such cancer details



In above screen you can see dataset contains 3 different types of cancers and just go inside any folder to view those images



So by using above images we are training AI with 3 different optimizers.

To implement this project we have designed following modules

1) Upload Histopathological Images Dataset: using this module we will upload dataset to application

2) Preprocess Dataset: using this module we will read all images and then resize all images to equal size and then normalize pixel values. After processing we will split dataset into train and test

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3) Train AI with ADAM: using this module we will feed Training Data to AI algorithm with optimizer as ADAM. After training we will apply test data in trained model to calculate prediction accuracy

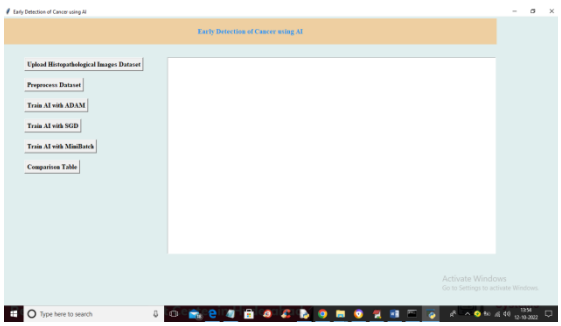
4) Train AI with SGD: using this module we will feed Training Data to AI algorithm with optimizer as SGD. After training we will apply test data in trained model to calculate prediction accuracy

5) Train AI with MiniBatch: using this module we will feed Training Data to AI algorithm with optimizer as MiniBatch. After training we will apply test data in trained model to calculate prediction accuracy

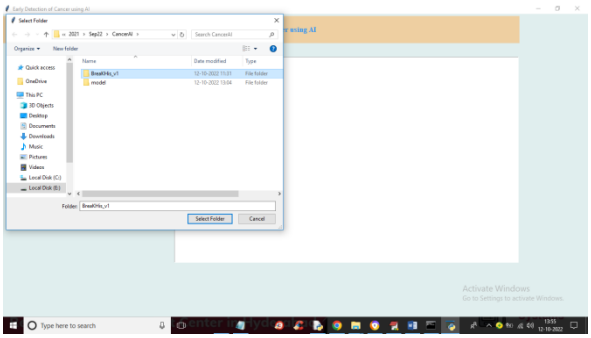
6) Comparison Table: using this module we will plot all algorithm accuracy and show performance in tabular format

SCREEN SHOTS

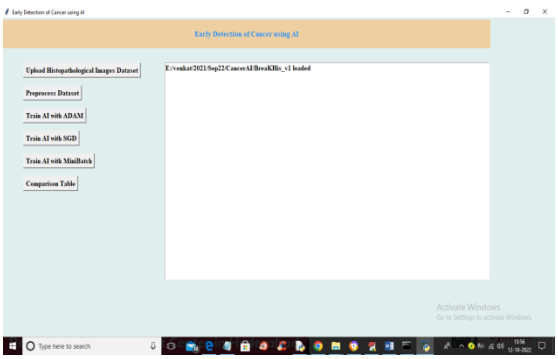
To run project double click on 'run.bat' file to get below screen



In above screen click on 'Upload Histopathology Images Dataset' button o upload dataset and get below output



In above screen selecting and uploading entire 'Dataset' folder and then click on 'Select Folder' button to load dataset and get below output



In above screen dataset loaded and now click on 'Preprocess Dataset' button to read and process images and get below output

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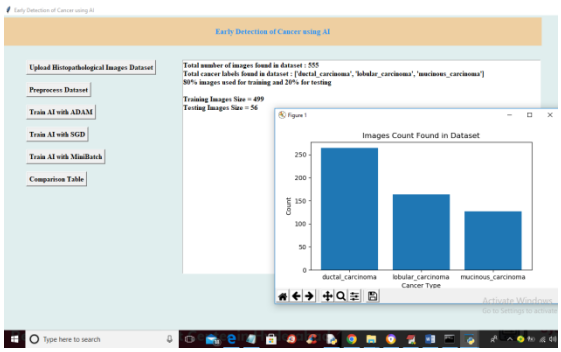
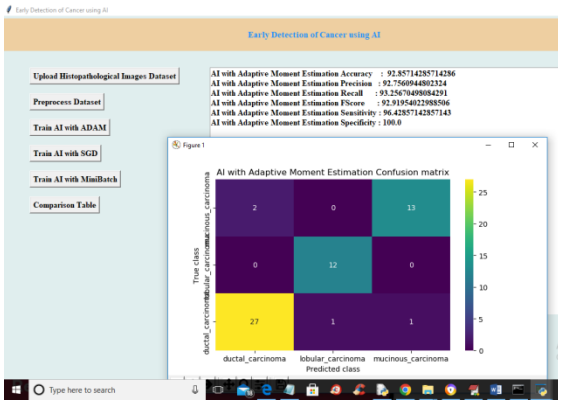
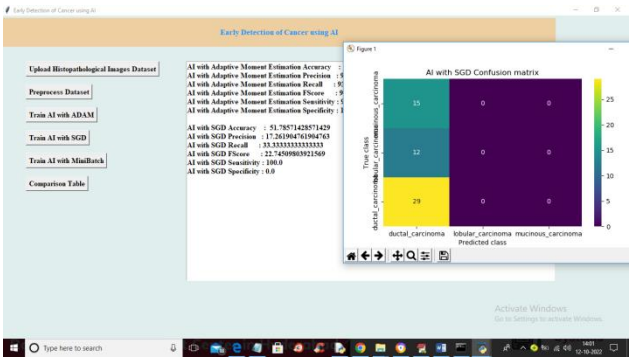


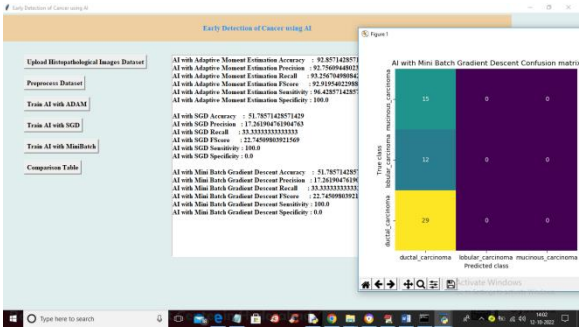
In above screen we can see dataset contains 555 images and then showing train and test data size and in graph x-axis represents 'Cancer' type and y-axis represents number of images of that cancer type and now close above image and then click on 'Train AI with ADAM' button to train AI and get below output



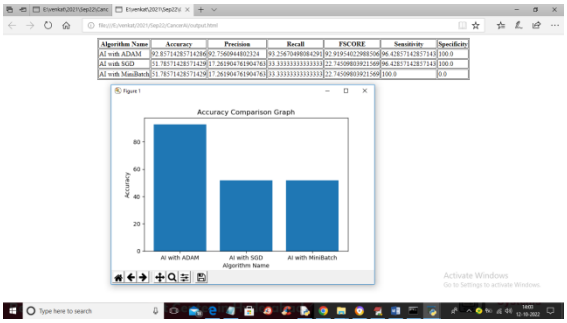
In above screen AI with ADAM got 92% accuracy and in confusion matrix graph x-axis represents Predicted Labels and y-axis represents TRUE labels and different colour boxes represents CORRECT Prediction count and same blue colour boxes represents incorrect prediction count. Now close above and then click on 'Train with SGD' button to train with SGD and get below output



In above screen AI with SGD we got 51% accuracy and now close above graph and then click on 'Train with MiniBatch' button to train AI and get below output



In above screen with Mini Batch also we got 51% accuracy and now close above graph and then click on 'Comparison Table' button to get below output



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In above screen we can see all algorithm performance in tabular and graphical format and in all algorithms 'AI with ADAM' got high performance or accuracy

CONCLUSION

The CA D Systems are beneficial to detect cancerous nodules& have a lot to offer to modern med icine. A nodule is identified with required area by using circle fit algorith m with maximu m rad ius which eliminates the unnecessary selection of wrong nodules. After every iteration, we get more accurate results. This led the system to provide Accuracy of 95.6%. The Sensitivity & Specificity of the system is 93.1% &100% respectively. Based on CT images, this system will give accurate and effective result of lung nodule detectionas benign or malignant lung nodule. In Future work, this system will help to diagnose cancer in different organs of human body. Techniques used in this system can be imp lemented in reducing the growth of abnormal cells or spreading to other parts of body. This system can be enhanced for MRI and Ultrasound images. The results obtained from A NN classifier are mo re precise and accurate but it requires more number of data inputs as compared with SVM classifier

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