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Lung Cancer Prediction Using Machine Learning and IoT Techniques

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ABSTRACT

The disease has a tendency to be asymptomatic mostly in its earlier stages thus making it nearly impossible to detect. That's why early cancer detection plays an important part in saving lives. An early detection can give a patient a better chance to cure and recover. Technology plays a major role in detecting cancer efficiently. Many researchers have proposed different methods based on their studies. In recent times, to use computer technology to solve this problem, several computer-aided diagnosis (CAD) techniques as well as system have been proposed, developed as well as emerged.These techniques have therefore been used as a model for the development and treatment of cancer. As, it is important that ML instruments are capable of detecting key features from complex datasets. Many of these methods are widely used for the development of predictive models for predicating a cure for cancer, some of the methods are artificial neural networks (ANNs), support vector machine (SVMs) and decision trees (DTs). While we can understand cancer progression with the use of ML methods, an adequate validity level is needed to take these methods into consideration in clinical practice every day.

I. INTRODUCTION

The main reasons for this is that prostate and breast cancer prognostic models are comparatively more advanced and systemic than pulmonary cancer. Thus, it is urgently necessary to establish an effective early-stage lung cancer forecast model. In linear and non-linear problems, SVM has superior predictor performance and is widely used in various fields including in medical matters. Even if SVM is a superior classifier, the field of cancer prognosis models is relatively immature.

This reason lung cancer has been entitled as one of the most fatal diseases. Tumour is made by multiplication of abnormal cells in lung cancer. Cancer cells tend to spread really fast due to blood streams ans lymph fluid that is present in lung tissue. In general, due to normal lymph flow, cancer cells frequently migrate to the middle of the chest. As cancer cells migrate to other tissues, metastasis occurs. It is important that cancer be detected as early as possible as it tends to spread and is beyond curable in case of a larger spread. It is difficult to diagnose lung cancer since it shows symptoms in the final stage and it is nearly impossible to save a person's life in the final stage. Images of lungs for examination are captured by imaging techniques such as Computed Tomography (CT), Positron Emission Tomography (PET), Magnetic resonance imaging (MRI) and X-ray.

CT image technique is the most common out of the mentioned methods due to its ability to give a view excluding overlapping structures. Interpreting and recognizing cancer is complicated for doctors. CT photographs are accurate for the diagnosis of lung cancer. To identify lung cancer, imageprocessing, and deep learning methods will be used. Accuracy can be improved using these approaches. Tumour detection and determination of its form, size, and location is a tough task. Timely detection helps in saving a lot of time. And this time can be used in providing early treatment to the patient.

II.LITEERATURE SURVEY

Detecting Lung Cancer Using Machine Learning Techniques
Author - Ashit Kumar Dutta
Year – 2022

In recent days, Internet of Things (IoT) based image classification technique in the healthcare services is becoming a familiar concept that supports the process of detecting cancers with Computer Tomography (CT) images. Lung cancer is

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one of the perilous diseases that increases the mortality rate exponentially. IoT based image classifiers have the ability to detect cancer at an early stage and increases the life span of a patient. It supports oncologist to monitor and evaluate the health condition of a patient. Also, it can decipher cancer risk marker and act upon them. The process of feature extraction and selection from CT images plays a key role in identifying cancer hot spots. Convolutional Neural Network (CNN) is one of the efficient feature extraction techniques that improves the performance of image classifier by reducing the entropy of image data sets.

Lung Cancer Classification and Prediction Using Machine Learning and Image Processing
Author – SharmilaNageswaran , G. Arunkumar
Year – 2022
Lung cancer is a potentially lethal illness. Cancer detection continues to be a challenge for medical professionals. The true cause of cancer and its complete treatment have still not been discovered. Cancer that is caught early enough can be treated. Image processing methods such as noise reduction, feature extraction, identification of damaged regions, and maybe a comparison with data on the medical history of lung cancer are used to locate portions of the lung that have been impacted by cancer. This research shows an accurate classification and prediction of lung cancer using technology that is enabled by machine learning and image processing. To begin, photos need to be gathered. In the experimental investigation, 83 CT scans from 70 distinct patients were utilized as the dataset. The geometric mean filter is used during picture pre-processing. As a consequence, image quality is enhanced. The K-means technique is then used to segment the images. The part of the image may be found using this segmentation.

Lung Cancer Prediction Using Machine Learning Algorithms on Big Data: Survey
Author – Dr. M. Kasthuri ; M. RiyanaJency
Year – 2020
Lung cancer is a malignant lung tumour that is characterised by the regulated growth of cells in the lung tissue. The most common cancer diagnosed worldwide is lung cancer. More deaths than any other kind of cancer occur due to lung cancer. Early diagnosis and care are very useful and efficient for the survival of cancer patients. Different image processing and soft computing methods may be used for identifying cancer cells from medical images. Classification depends on features extracted from the images. In order to produce better classification results, the focus is on the feature extraction level. In order to distinguish a pattern that can provide some useful insights into what combination of features is most likely to result in an abnormality, this knowledge is then given to machine learning algorithms. The prediction of lung cancer is analysed using various machine learning classification algorithms such as Naive Bayes, Support Vector Machine, Artificial Neural Network and Logistic Regression. The key aim of this paper is to diagnose lung cancer early by examining the performance of exist classification algorithms.

Lung Cancer Prediction Using Machine Learning Methodologies
Author – VemulaSuvarchala , P VenkataSubbareddy , Srinivasa Rao Madala
Year – 2021
Lung cancer usually occurs in both men and women as a result of unmanageable lung cell growth. This constitutes a severe respiratory problem in both the inhalation and the exhalation of the chest. Cigarette smoking and tobacco smoke are the main contributors to lung cancer in the global health organisation. The death rate due to lung cancer in young and old people is rising day by day in comparison with other cancers. Although high-tech medical facilities for been well and efficient medical treatment are available, the mortality rate is not yet properly monitored. Therefore way earlier safety measures are extremely necessary in the initial stage so that symptoms and effects can be identified early in the process for proper diagnosis. Nowadays, machine learning has a big impact on the health sector as a result of its high computational capacity for early disease diagnosis with reliable data analysis.

III.EXISTING SYSTEM

Convolution Neural Network (CNN) is an Artificial Intelligence (AI) technique which takes an image as an input and extracts unique features [13–16]. In addition, AI approaches are broadly for detecting the hidden patterns of dangerous diseases from CT images. The structure of a CNN is similar to the pattern of Neurons in the human brain. A CNN can capture the spatial and temporal dependencies in an image by using features of an image and extract an individual layer in its network [17]. It intends to reduce the image into an easily understandable form without losing critical features. An image classifier can be built with the support of CNN for effective output. The RF classifier is a subset of the decision tree, which uses an ensemble learning technique [18–21]. It generates multiple trees depending on the number of data and integrates the outcome of all the trees. It handles non–linear parameters efficiently rather than the existing state–of–the art classifiers.

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DISADVANTAGES

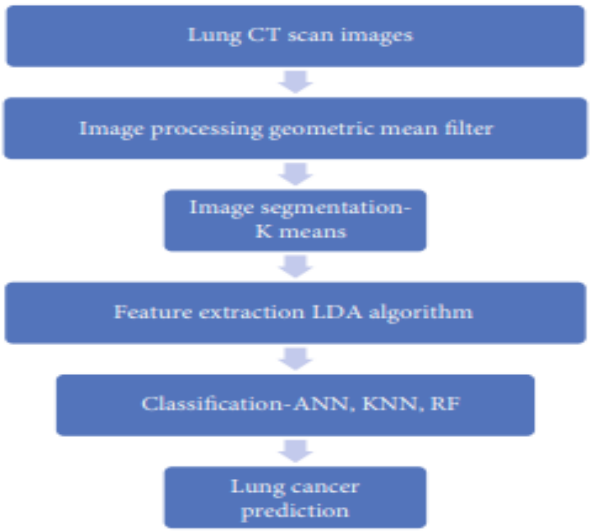
- It requires more computational power and resources.
- It takes decision based on most of the vote this needs longer training time.
- To overcome the issues of the RF classifier, CNN is integrated with the RF to reduce the entropy of the data set and improve efficiency.

IV.PROPOSED SYSTEM

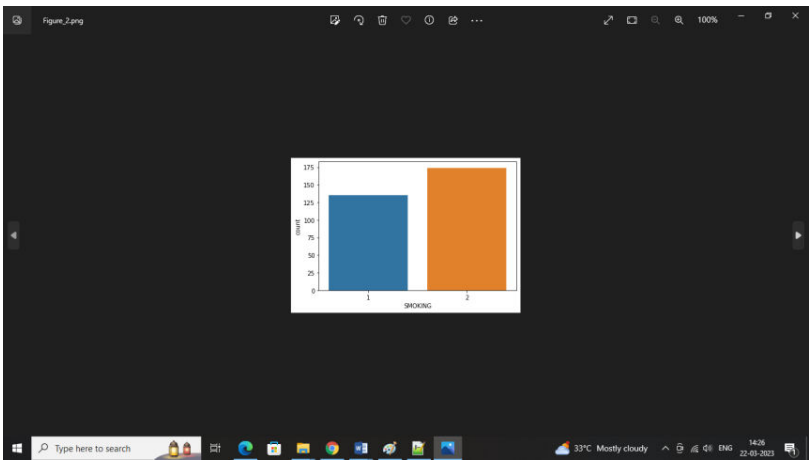
Proposed a method using 2 architectures, one for the segmentation of nodules and the second one to determine the malignancy level. For determining the malignancy level CNN is used for classification as well as for the feature extraction, max pooling is used for sub pooling, ReLU as the activation function, and softmax is the classifier used to perform the classification and assign malignancy level. Adam classifier is used to optimize weight selection in convolutional kernels. For the segmentation of CT scanned images, pre-processing is done using simple thresholding, clear border, morphology erosion, morphology closing, and morphology opening respectively.

ADVANTAGES

- Able to detect false positive nodules correctly.
- Compared with the conventional CAD system proposed method gives excelling detection.
- The false-positive detections seem to be increased by these pre-existing diseases..



V.RESULTS



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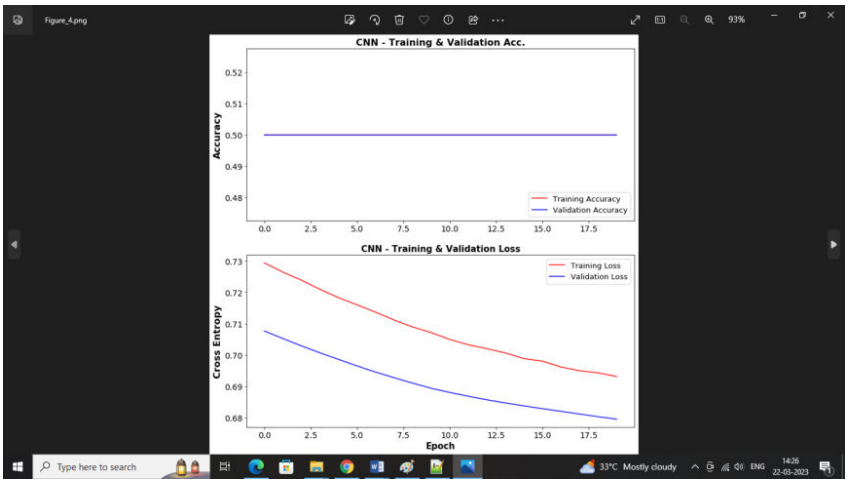

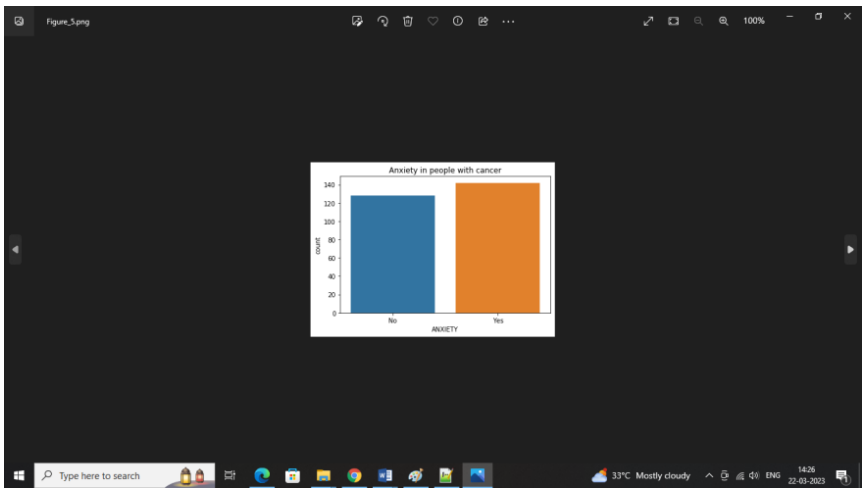

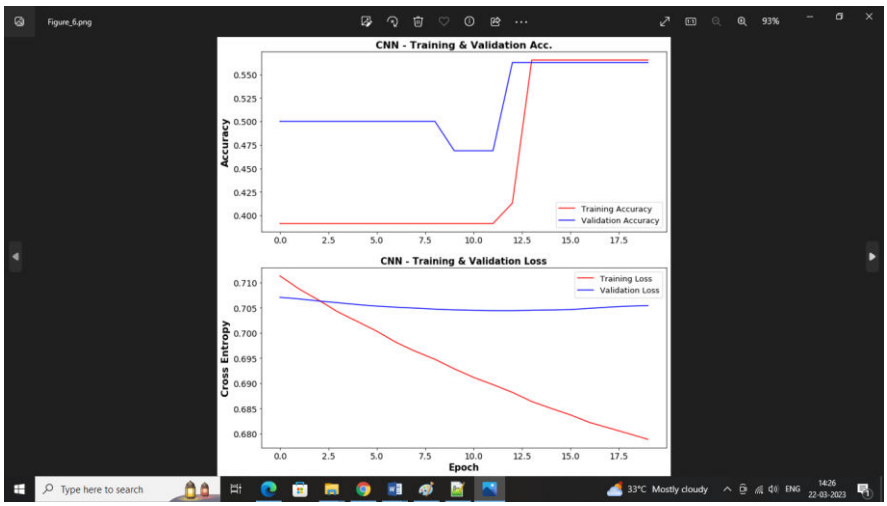

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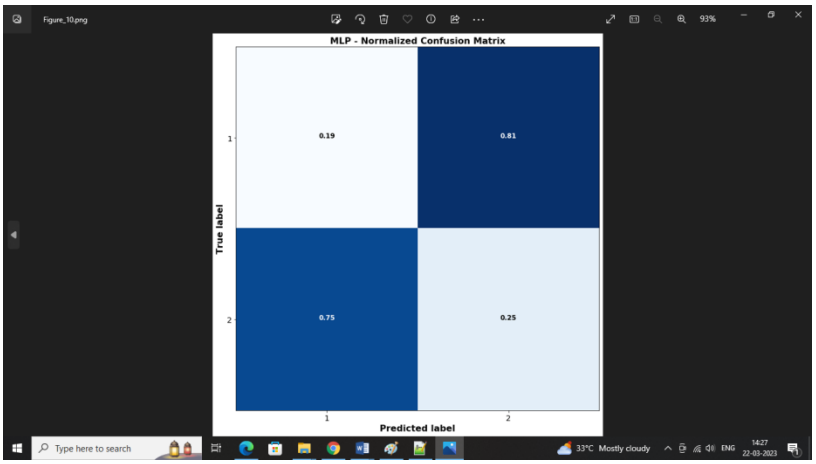

VI.CONCLUSION

One of the most fatal diseases to have existed is lung cancer. This disease unfortunately is extremely tough to treat after having spread upto an extent or reaching a serious stage. Computer-Aided Detection (CAD) is one of the constantly growing technologies that help detect cancer by feeding in certain inputs containing patient-related information such as scans like CT-Scan, X-Ray, MRI Scan, unusual symptoms in patients or biomarkers, etc. SVM, CNN, ANN, Watershed Segmentation, Image enhancement, Image processing are a few methods used to improve the accuracy and aid the process. For training, the most popular datasets used are LUNA16, Super Bowl Dataset 2016, and LIDC-IDRI. By the means of this review paper, we aim to list out all the major researches that have been done over the past years and can be improved upon to achieve better results.

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