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Cancer Detection using Machine Learning

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ABSTRACT: Cancer is an irregular extension of cells and one of the regular diseases in India, which has to lead to 0.3 deaths every year. Even though modality has different considerations, such as complicated history, improper diagnostics, and treatment main causes of deaths. It is often caused by genetic disorder aggregation and a variety of pathological changes. It may take any form and is very difficult to detect during the early stages. Cancer also known as a tumor must be quickly and correctly detected in the initial stage to identify what might be beneficial for its cure. Cancerous cells are abnormal areas often growing in any part of the human body is are life-threatening. Getting a clear-cut classification from an image is an inconvenient task as the pathologist must know the detailed features of normal and the affected cells. Manual identification of cancerous cells from microscopic images is time-consuming and requires good expertise. This paper presents an overview to analyze, review, categorize and address the current developments in human body cancer detection using machine learning techniques for breast, brain, lung, liver, skin cancer, and leukemia. It focuses on image analysis and machine learning. The study highlights how This system processes the symptoms of Cancer. This system helps the doctors to identify the symptoms and take precaution measures.

KEYWORDS: Cancer, Machine Learning, CNN.

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. Cancer also known as tumor must be quickly and correctly detected in the initial stage to identify what might be beneficial for its cure. Even though modality has different considerations, such as complicated history, improper diagnostics and treatment that are main causes of deaths. Even though many methods to cure cancer are available such as chemotherapy and target therapeutics and these have been proven to be effective, poor prognosis persisting in the detection of advanced lung cancer nodules results in a survival time of less than 1year. Therefore, to increase the lifespan of a patient with a lung lesion it is important to detect it in an early stage. CT (Chest tomography) scan, is broadly used in medical field to detect tumors of the lungs. Irregular pattern of cell growth can be given as either benign or malignant. Benign tumors are cancer type and generally, they are considered as moles, which are not harmful. Whereas, malignant tumors are treated as cancer which is threatening to life. They can also damage the other tissues of the body.

In this system, we have used Machine Learning techniques to solve the problems. The model developed takes the cell Image of the patient and does the analysis using Machine Learning algorithms such as Convolutional Neural Network(CNN) to predict the stage of cancer. This model helps in early detection of cancer. Perception and interpretation of medical images is improved which helps radiologists and doctors.

II. LITERATURE REVIEW

Zilong Hua, Jinshan Tanga,b,c, Ziming Wang bhav proposed the system in paper titled “Deep learning for image-based cancerdetection and diagnosis”.The focus of this article is to review, analyze, categorize methodologies of differenttypes of cancer and uncover existing limitations.The primary intention of this researchis to present an intelligent background to new researchers who wish to begin theirresearch activity in this field.Algorithm and method used in proposed system is Featureextraction algorithm.Advantagesof this systemis Reduce the need of feature engineering which is time consuming part especiallyin processing redundant image data.Disadvantages of this system



are Training process is extremely computational expensive and it is quite time consuming to train a deep and complex model.[1].

Akash P Keladi, Ananth Sai Raghava K, Chennasamudram Harsha, Manoj Krishna D, Dr. M. Vinoth Kumar have proposed the system in paper titled “Survey on Lung Cancer Detection Using CNN”. This paper proposes an ML-based system has been developed which can be effective in diagnosing cancer which is used to detect symptoms of cancer. Method used in proposed system are Artificial intelligence-based algorithm, Convolutional Neural Network. Advantages of this system are it can extract the spatial from the data using kernels, which other networks are not capable of. Disadvantages of this system are missing data and noisy data present in the dataset can alter the performance of the model.[2].

Tanzila Saba have proposed the system in paper titled “Recent advancement in Cancer Detection Using Machine Learning”

This paper propose the research to analyze, review, categorize and address the current developments of human body cancer detection using machine learning techniques. Method used in proposed system are CNN, K-Nearest Algorithm. Advantages of this system are It provides systematic review of current techniques in diagnosis and cure of several cancers affecting human body. Disadvantages of this system are Main challenges in the cancer detection and cure process are understand the cancer growth phenomena, early treatment, innovative methods of designing and delivering clinical trials and enhance accuracy that will be useful for the physicians as a second and early opinion.[3].

III. PROPOSED SOLUTION

System Architecture: -

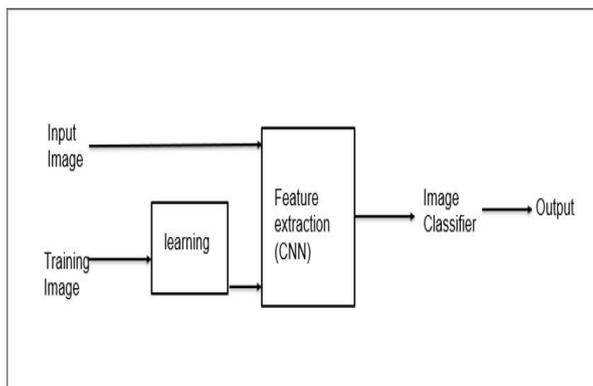


Fig. 1:- System Architecture

The dataset is divided into Training data and testing data. There are also two phases, training and testing phases. Understanding the relation between data and attributes is done in training phase. The data samples are given for system which extracts certain features. Based on these extracted features a model is built. A classifier is used which classifies all the given samples to train the model. In testing phase, the images are provided and the same features encountered during training phase are extracted. The new images are compared and classified depending on color, shape, arrangement. At this point the images are detected and they are shown as positive or negative. The positive result depicts; the cells are cancerous and the negative result depicts that the cells are non-cancerous.

Algorithm:-

Convolutional Neural Network:-

CNN is convolutional neural network which is artificial neural network it is used for analyzing image. CNN are widely used in image recognition, image classification, object detection and face recognition. CNN image classification takes an input image, process it and classify it under certain category. CNN is another type of neural network that can be used to enable machine to visualize things and perform task such as image classification, image recognition and object detection. Image classification is task of taking an input image and gives output as class [a cat, a dog, etc.] or a



probability of classes that best describes image. It is one of the types of neural network model which is designed for working with image data. In CNN the input image pass through a series of convolutional layers, pooling layer and full connected layer and finally productive output which can be single class or probability of classes that best describes the image.

CNN is a kind of a Deep-NN that consists of many concealed layers such as the convolutional layer, rectified linear unit layer, pooling layer and a completely connected normalized layer. To reduce the memory CNN largely shares its weights in the convolutional layer and thereby improving the performance. we use a deep learning methodology to detect patients' nodules present in Chest tomography scans. The Convolutional Neural Network is formed of a total of twenty layers, these twenty layers are partitioned into 2 parts. In the first part valuable volumetric information of the input data is extracted using Convolutional Neural Network. The network further consists of numerous convolution layers, Rectified linear unit, & max pooling layers. Classifier is the next part of the Convolutional Neural Network. A Deep CNN consists of many hidden layers such as fully-connected layer, thresholding layer. Finally, SoftMax layer is used to determine the result.

We use CNN because it is feedforward neural network which is used for representation of image but in case of complex image, CNN will fail to give better prediction, that is because it cannot learn pixel dependencies present in the images. CNN can learn multiple layers of feature representation of image by applying different transformation. In CNN, no of parameter for the network to learn in significantly lower than multilayer network.

Set-up: -

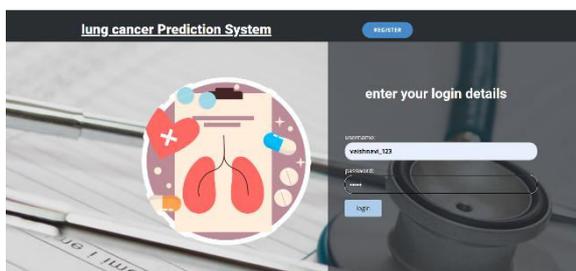
Our system successfully executed on i3 Processor with 4GB RAM. To run this program, we use Google colab (with python version 3.7.8) Jupiter notebook. We have successfully installed TensorFlow on google colabJupiter notebook. After we have run our code cell by cell. The system tested successfully. We have taken our dataset from Kaggle(Lung Cancer Dataset).

IV. IMPLEMENTED SYSTEM

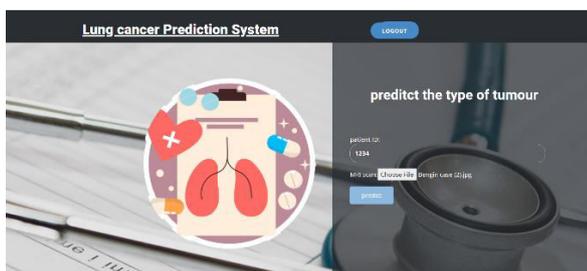
The proposed system reduces workload of doctors and saves time than the existing observation system because it informs to doctors about the stage of cancer of a particular person, so that patient can take precaution and go for further treatment to cure its cancer. We have collected and stored the data in our system database. We have given the input to the system and with help of stored data we trained the proposed system and we detect the cancer stage with 90% accuracy.

System consists of following modules:

Login Page: User login into the system with username and password.



Prediction Page: User needs to provide patient id and then give image as input to the system. Then CNN analyses the image and it predicts the stage of cancer





In fig2. has correctly detected the cancer stage.



Fig. 2: - Prediction of Cancer

V. RESULT ANALYSIS

We have taken the dataset of 1000 images, then we give image as input to the system. Then CNN analyses the image and it predicts the stage of cancer in one execution of program.

We validate our system with accuracy with number of iterations and loss with number of iterations. After 10 iterations we get the accuracy of this system is 95%.

In fig.3 The graph shows accuracy of model. It shows our train model accuracy with validation.

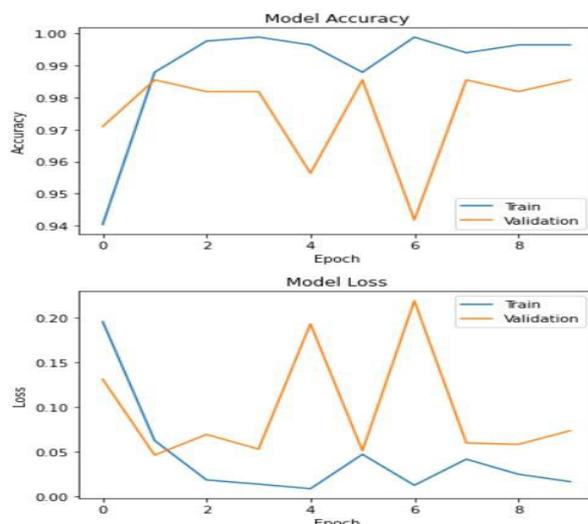


Fig.3: - Model Data

VI. CONCLUSION

In this project, we have introduced an efficient system which includes identification of stage of cancer, we have used CNN. Machine learning algorithm which is able to detect the stage in one single algorithm run that makes the system faster.

This proposed system is also capable to detect a stage of cancer. After identification of stage of cancer or detection of cancer it alerts patient to cure its cancer.

VII. ACKNOWLEDGEMENT

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