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Multi Disease Detection and Predictions Based On CNN Algorithm

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ABSTRACT: Chronic diseases such as skin disease, cancer, diabetes, stroke, and arthritis are the leading causes of disability and death in India and throughout the world. As compare to other diseases these types of diseases having high rate of deaths, so there is need of promising solution over chronic diseases. Medical data growth is in healthcare communities, accurate analysis of medical data benefit early disease detection, patient care and community services. However, the analysis of patients is depends on accuracy of diagnosis and then treatment as well. The wrong diagnosed patients lead to deaths in chronic type diseases. So the high risk of diagnosis there is need of accurate diagnosis aid for chronic diseases. This diagnosis system based on machine learning for giving promising solution with high accuracy. The proposed system consists of many diseases such as lung cancer, brain tumor, skin disease detections and stages predictions. High rate of deaths due to chronic diseases such as skin disease, lung cancer, brain tumor need to develop proper diagnosis system which helps to doctors. The wrong diagnosis leads to human deaths so we need to work on accurate diagnosis of multiple diseases. Many works is already carried out for different diseases but there is not any promising solution found that gives accurate diagnosis for all in one. The proposed system consists of many diseases such as lung cancer, brain tumor, skin disease detections and stages predictions. This develop system for multi disease detection and stages predictions gives early detection and saves lots of life's by reducing death rate by chronic diseases.

KEYWORDS: Convolutional Neural Network, Computed Tomography, Support Vector Machine.

I. INTRODUCTION

Now day's skin diseases are growing rapidly by busy and stress full life. All type of age groups are under skin diseases so need of early detection of skin disease by using features or reports. Due to large amount of smoking and air pollution around the world, lung cancer has become one of the most common and deadly disease in recent decades. It is one the most dangerous disease among men and women and early identification and treatment is the best available option for the infected people. Main objective behind to develop a system helps the doctors to cross verify their diagnosed results which gives promising solution over existing death rates. This proposed work try to invent unique platform and most promising solution for early diagnosis of multiple diseases. Existing work analysis accuracy is reduced when the quality of medical data is incomplete. Moreover, different regions exhibit unique characteristics of certain regional diseases, which may weaken the prediction of disease wrong. So this is giving more accurate solution by using machine learning and Convolutional neural network to detect diseases and make predictions. The proposed system consists of many diseases such as lung cancer, brain tumor, skin disease detections and stages predictions.

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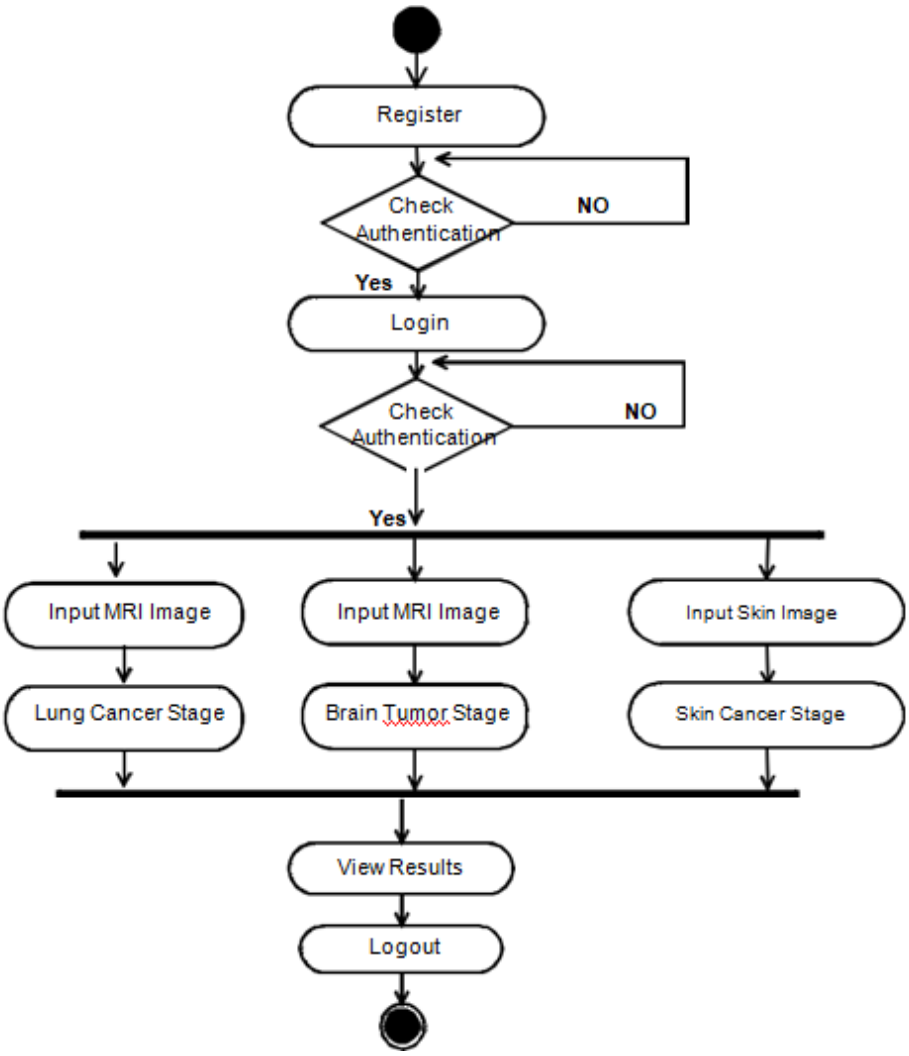

Fig. Flow of proposed work

Above figure shows internal working of multiple diseases detection and stages prediction system. In which NSCLC Radio-genomics lung cancer CT image dataset, skin disease dataset and brain tumor MRI images are used. After getting this DICOM medical formatted images those converted by DICOM converter to PNG format. Image acquisition contains image reading by using opencv-python for process it. After getting image of lung cancer it transfer into noise reduction for removing noise from it. Then image processing techniques applied on it like binary image conversion and gray image conversion followed by segmentation. The image features get collected and drafted into machine model in training phase of machine learning for future prediction of multiple diseases and stages evaluations.This System is worked on supervised dataset and used deep Convolutional neural network for achieving high accuracy.

II. OBJECTIVE & GOALS

- To reduce death rate by chronic diseases in the world.
- To give unique solution for multiple diseases.
- To provide higher accuracy over previous research.
- To give most promising tool that can acceptable by all the doctors.
- Detection of multiple types of Diseases.

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- By using deep learning approach trying to achieve higher accuracy.
- Provide diagnosis for:
  1. Lung Cancer
  2. Brain Tumour
  3. Skin Disease
- By improving proper diagnosis increase rate of saving life's.

III. LITERATURE SURVEY

Phillip Ly et al. [1] proposed Deep learning neural networks have made important development in image analysis and have been used for skin cancer recognition. Early detection and proper treatments for malignant skin cancer cases are important to ensure high survival rate in patients. This propsed system present a novel deep learning based convolutional neural network (CNN) model for generating noble models on mobile platforms such as Android and IOS.

Anuradha S. Deshpande et.al[2] states among every other cancer types, Lung Cancer is one of the most widely recognized reasons for death all through the world. It is important to get early treatment on time, to recover persons which are affected by lung diseases. In the Lung disease growth recognition framework, this system has different steps of malignant growth by using Support vector machine classifier (SVM). This system get increasingly extract the fact of the various phases of disease by using different methods. This Proposed system has played out the combination of CT and MRI examining. This method improves the nature of the information.

Abbas Khosrav et.al [3] proposed recognition of lung disease using a low size, high dimensional dataset is trying because of wrong tests to become identified with an exact diagnosis and stage predictions. Deep learning is observed to have the option to recognize the basic structure of information using auto encoders and different methods. In this work, a base auto encoder grouping system is proposed which initially used detection and after that prepares a fake neural system with these features. Final outcomes shows the profound educated classifier outflanks every single other classifier at the point when prepared with all properties and same preparing tests.

Ali M. Hasan et. al [4] introducing brain tumor classification in magnetic resonance imaging (MRI) is viewed as a complex methodology in light of the inconstancy of tumor shapes and the intricacy of deciding the tumor area, size, and surface. Brain tumor division is a used to overcome human recognition mistake. Therefor this examination proposes a mechanized strategy that can recognize tumor cuts and portion the tumor overall picture cuts in volumetric MRI brain classes. Initial, a lot of calculations in the pre-preparing stage are utilized to clean gathered dataset. A multi-layer perceptron neural system is received as a classifier, and a bouncing 3D-box-based calculation is utilized to distinguish the area of obsessive tissues in the MRI images. At long last, the 3D dynamic shape without edge is connected to portion the cerebrum tumors in volumetric MRI checks.

Shadab Adam Pattekari and Asma Parveen [5] states Choice Support in Skin Disease Prediction Framework is created using Naive Bayesian classification strategy. The framework divides deep learning from an skin disease database. This is the best model to detect patients with skin disease. This model could answer complex questions, each with its very own quality without breaking a sweat of model structure, to get high accuracy. HDPS can be further improved and extended. For, instance it can combine other therapeutic qualities other than the above model. It can likewise combine other information mining systems. Ceaseless information can be utilized rather than simply straight out information.

S.Florence et.al. [6] introducing medicinal services condition is an ever increasing number of information advanced, yet the measure of learning getting from those information is less, on the grounds that absence of information investigation apparatuses. This system get the concealed connections from the information. In the human services framework to foresee the skin disease consummately, there are a few methods which are now being used. The consequences of the expectation give more exact results than different procedures.

knowledge, none of the existing work focused on both data types in the area of medical big data analytics. Reducing death rate by wrong diagnosis using giving accurate diagnosis. Existing system does not provide diagnosis system which helps to doctors.

IV. METHODOLOGY USED IN PROPOSED SYSTEM

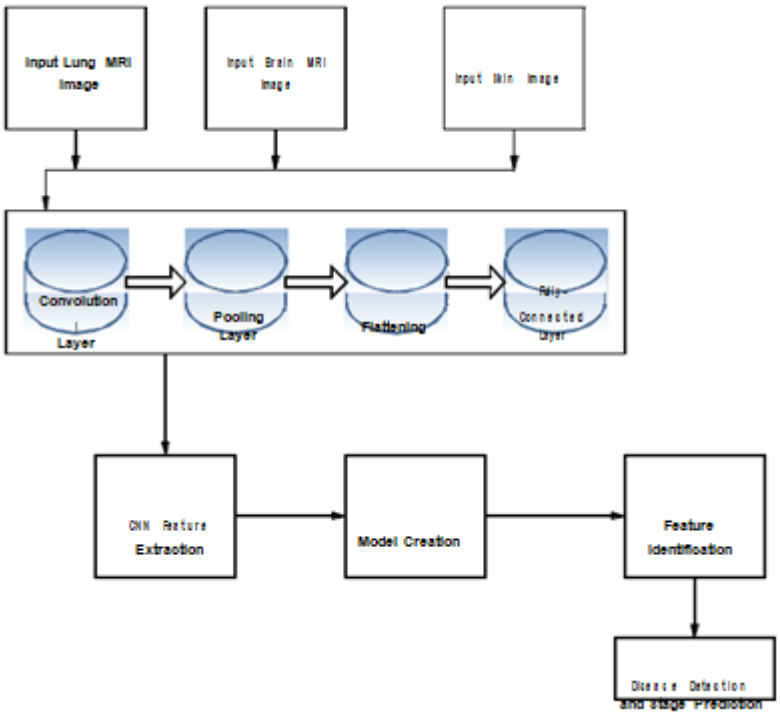

Fig.2 System Architecture A] Modules

1) Lung Cancer Detection
2) Skin Disease Identification
3) Brain Tumor Detection

B] Features:

1.Lung cancer type detections according to CT-Scan Images.
2.Skin disease identification according to different features
3.Brain Tumor detections according to MRI Images.
4.Display Precaution list to avoid the various disease.

IV. METHODOLOGY USED IN EXISTING SYSTEM

Reliable identification and classification of chronic diseases requires pathological test, namely, needle biopsy specimen and analysis by experienced pathologists as it involves human judgment of several factors and a combination of experiences, a decision support system is desirable in this case. After diagnosis of manual judgments the rate of saving life of patients is not much good. The techniques used in existing work are unable to give Nobel solution over chronic diseases and accuracy is very poor. Algorithm using structured and unstructured data from hospital. To the best of our
In a proposed system, this system is proposing experiment on chronic diseases like lung cancer, brain tumor and skin disease with limited set of supervised data. This system proposed a new Convolutional neural network based multimodal disease risk prediction model for limited chronic diseases with higher accuracy.It is going to solve accuracy issue in diagnosis of lung cancer with accurate stage predictions. This system also work on brain tumors detections by machine evaluations depends on tumor sizes in mm. Skin disease detection depends on diagnosed dataset such as features of skin images. In proposed system consist mainly 3 modules Lung Cancer Detection, Skin Disease Identification, Brain Tumor Detection. Admin and users are two modules include in our system. Admin first gather the information about multiple diseases in the form of text as well as in the form of images. After gathering of information like preprocessing on the data, training of the data, model generation according to the features of the data. User insert

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the MRI image for checking brain tumor or lung cancer and enter text features for detection of skin disease. Using this proposed system, it predicts the disease according to different type of stages. System also provide precaution list to the user for prevent form disease. This proposed work develops a system for multi disease detection and stages predictions gives early detection and saves lots of life's by reducing death rate by chronic diseases. This system propose a novel Lung detection and Stage prediction mechanism is proposed which first learns deep features and then trains an artificial neural network with these learned features. Experimental results show the deep learned classifier outperforms all other classifiers when trained with all attributes and same training samples. It is also demonstrated that the performance improvement is statistically significant. Classification of lung cancer using a low population, high dimensional data-set is challenging due to insufficient samples to learn an accurate mapping among features and class labels. Current literature usually handles this task through handcrafted feature creation and selection. Deep learning is found to be able to identify the underlying structure of data through the use of CNN and other techniques.

Advantages

1. This shows that application of machine learning has the potential to significantly detect and classify with almost high accuracy for the low population..
2. High dimensional lung cancer data-set without requiring any hand-crafted, case specific features.
3. High processing speed enhanced CNN classifier model.

A. **Image Processing :-**

An image is made up of RGB colours. Pre-processing unit consists of noise removal, grey scale conversion, binary conversion of images followed by feature extraction. In future extraction five steps followed in which fingertips searches by eccentricity. Next elongations of images are measured by considering pixel segmentation as well as rotation of images.

B. **Image Filtering :-**

Filtering is a technique to modify or enhance the image, i.e. to highlight certain features or remove other features. It includes smoothing, sharpening. and edge enhancement. Image filtering algorithms generate an output pixel by observing the neighbourhood of the input pixel in an image. Image filtering algorithms are used to remove different types of noise from the image.

C. **Feature Extraction:-**

In feature extraction, algorithmic study used to find the feature vectors of systematic results combines K curvature and convex hull algorithms. In present work “K convex hull” algorithm which is used to detect fingertip with greater accuracy. In this system, CNN is used for future recognition in which we having the input unit of training data set of images.

D. **Segmentation :-**

Image segmentation is the way toward apportioning an advanced picture into various portions (sets of pixels). All pixels in an area share a typical property. Least complex property that pixel can share power. The objective is to disentangle and change the portrayal of the picture into something that is increasingly important and less demanding to break down.

E. **Edge Detection :-**

Edge defines the boundaries between regions in an image which helps in object detection. There are many edge detection operators and algorithms available. Edge Detection Operators and Algorithms used in our research like Convex hull method.

F. **Feature Recognition:-**

Brain-inspired systems used to replicate how humans learn. Consist of input, hidden and output layers that transform the input into something that the output layer can use. Excellent for finding patterns which is complex to human for extract and teach the machine to recognize. CNN gathers their knowledge by detecting the patterns and relationships in data and learns (or is trained) through experience, not from programming.

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VI. RESULTS AND DISCUSSION

In multi disease detection and stage prediction this system has been implemented highly trained model that can accurately recognize multiple diseases. This system uses Gaussian blur for gray scale conversion, Otsu's method for binary conversion of images after that this system used convex hull for edge detection.

G. Gray scale conversion

In gray scale conversion colour image is converted into a gray form using Gaussian blur. Colour image containing noise and unwanted background which is removed or blurred by using this method.

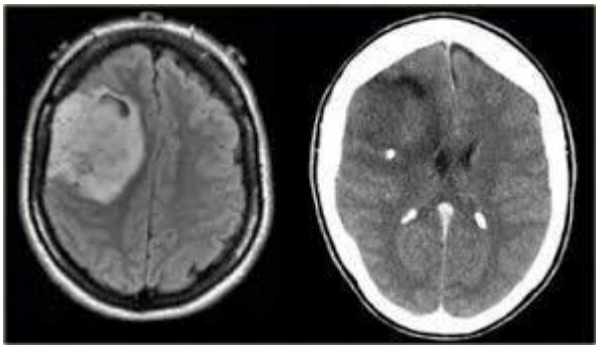

Fig.3 Gray Image

H. Binary conversion

Gray scale image is given to input for Otsu's method for binary conversion. In Binary form of images converted in 0 and 1 form means black and white.

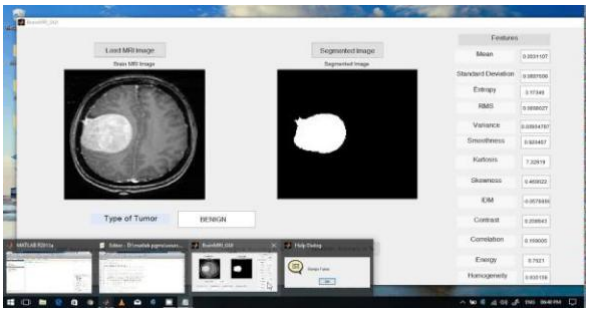

Fig.4 Binary Image

I. Edge Detection

In Edge detection binary image get dimensions by counters using convex hull algorithm. In which eccentricity finding drawing edges around white portion of binary image.

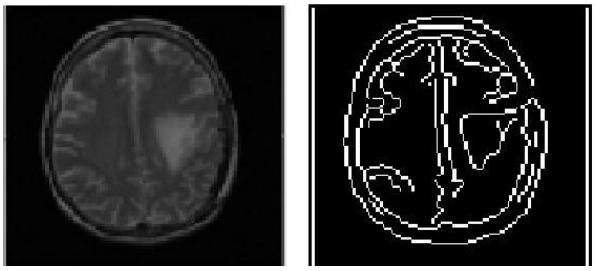

Fig.5 Edge Detection Image

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Training Model

This system is using tensor flow for extracting feature's of training dataset. In which 12000 image samples are trained by using training model. Finally plot files generated as an output of this trained model.

K. **Testing Model**

In final phase of data testing in which brain tumor MRI, Skin dataset and lung cancer CT images were matched by this training model with higher percent of accuracy.

After matching all type of disease images respective results of stage and cancer cell detection display on console and stored in text file as well.

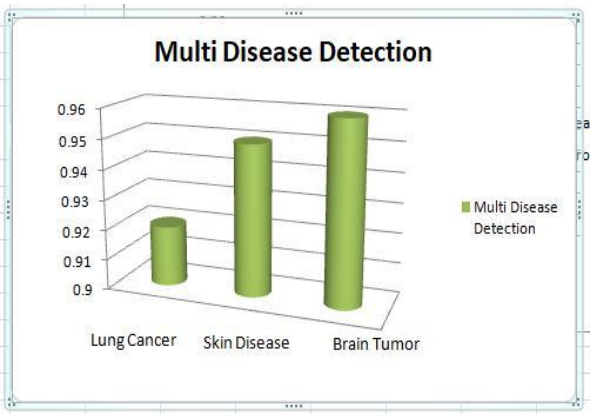
TABLE I

In this experimental setup, In table 1 describe this system modules and respective generated output.

Disease Name	Accuracy	Time Taken(sec)
1 Lung Cancer	87	609
2 Brain Tumor	85	740
3 Skin Disease	89	910

Table 1 Lung cancer stage evaluation criteria

L. **Comparative Study Graph**



Graph 1: Average Accuracy Rate

M. **Accuracy Rate of System**

All lung cancer image samples were trained by this trained model using deep neural network. The same procedure followed by this skin and brain tumor model.

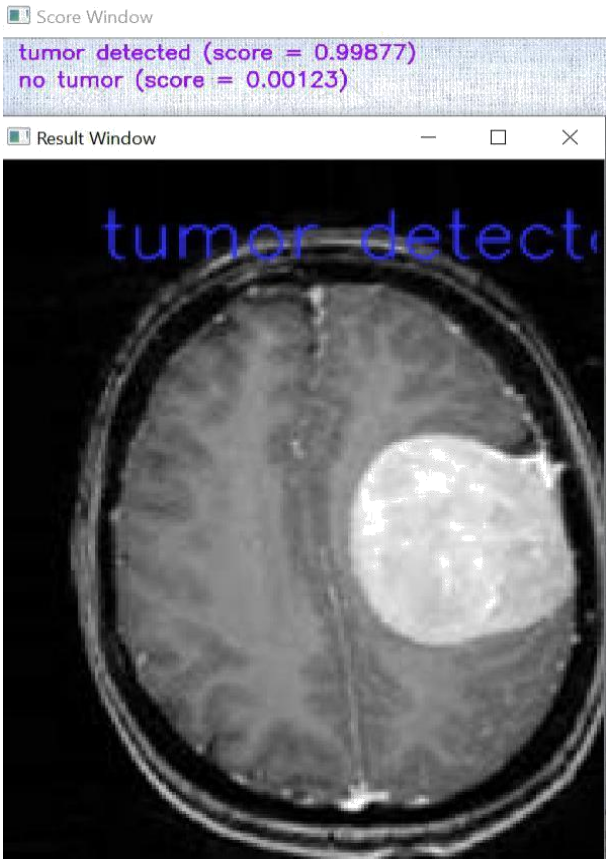


Fig:6 Brain Tumor Detection

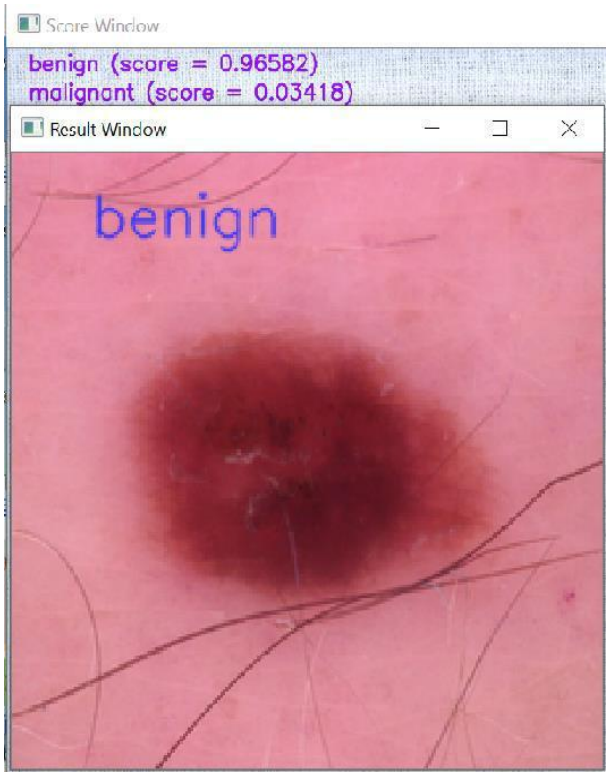


Fig:7 Skin Cancer

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VII. CONCLUSION

Thus this system implemented multi disease detection system over machine learning and CNN techniques which solves existing accuracy problem as well as reduce death rates by chronic type diseases like lung cancer detection, brain tumor detection and skin disease. After detection of disease inform to users that how to prevent from a disease.

For future work, this system will implement a technique on some more chronic diseases with rich dataset. Increasing the number of diseases and dataset used for the process, and this system will improve the accuracy.

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