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# Lung Cancer Detection in Radiology Images using CNN

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***Abstract:*** ***A risk factor is anything that increases chances of getting a disease, such as cancer. Thus diagnosing the cancer at the earliest stage is very important. Nowadays any cancer affects the human and may lead to death and lung cancer is one of its kind.to decrease the mortality rate and give a good treatment for the affected ones we need a better technique to diagnosis the lung cancer in initial stage itself. Early prediction of Lung Cancer will help with the survival of cancer patients. Machine Learning and Deep Learning have been widely used in the diagnosis of Lung Cancer and on the early detection. The main aim of the research is to review the role of deep learning in Lung Cancer detection and diagnosis. So we have used the convolutional neural network (CNN) which is a class of deep neural network which presents lung cancer detection using Radiology Images.***
***Keyword: Deep Learning, Lung Cancer, Convolutional Neural Network, Radiology Images.***

## I. INTRODUCTION

Deep learning is an Artificial Intelligence (AI) function that imitates the workings of the human brain in processing data and creating patterns for use in decision making. Deep learning is a subset of machine learning in artificial intelligence that has networks cap able of learning unsupervised from data that is unstructured or unlabeled. It is also known as deep neural learning or deep neural network. Deep learning AI is able to learn without human supervision, drawing from data that is both unstructured and unlabeled. It is a form of machine learning, can be used to help detect fraud or money laundering, among other functions. As a subset of machine learning, deep learning uses hierarchical neural networks to analyze data. Neuron codes are linked together within these hierarchical neural networks, similar to the human brain. Unlike other traditional linear programs in machines, the hierarchical structure of deep learning allows it to take a nonlinear approach, processing data across a series of layers which each will integrate subsequent tiers of additional information.Deep-learning architectures such as deep neural networks, deep belief networks, graph neural networks, recurrent neural networks and convolutional neural networks have been applied to fields including computer vision, speech recognition, natural language processing, machine translation, bioinformatics, drug design, medical image analysis, material inspection and board game programs, where they have produced results comparable to and in some cases surpassing human expert performance. Applications of the Deep Learning are in the following fields:

### *A. Speech Recognition*

Speech recognition is the process of transforming spoken words into text. It is additionally called automatic speech recognition, computer speech recognition, or speech to text. This field is benefited from the advancement of deep learning approach and big data.

### *B. Image Recognition*

Image recognition (or image classification) is the task of identifying images and categorizing them in one of several predefined distinct classes. So, image recognition software and apps can define what's depicted in a picture and distinguish one object from another.

### *C. Visual Art Processing*

DL can now create artworks similar to famous artists like Van Gogh or Picasso thanks to the neural style transfer. The idea is to separate the style representation and content representations in a CNN learned during a computer vision task. Following this concept, the model employs a pre- trained convolutional neural network to transfer styles from a given image to another.

### *D. Natural Language Processing*

Understanding the complexities associated with a language like its syntax, semantics, expressions, or even sarcasm, is one of the hardest tasks for machines to learn. Natural Language Processing through Deep Learning (Deep NLP) is trying to achieve the same. Earlier Bayesianmodel and SVM were used to build time and memory consuming complex models but now vectors representations of words, convolutional neural networks (CNN), recurrent and recurrent neural networks (RNNs), and memory augmenting strategies are helping achieve new heights in NLP.

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*E. Drug Discovery and Toxicology*

A large percentage of candidate drugs fail to win regulatory approval. These failures are caused by insufficient efficacy (on-target effect), undesired interactions (off-target ef fects), or unanticipated toxic effects. Research has explored use of deep learning to predict the biomolecular targets, off-targets, and toxic effects of environmental chemicals in nutrients, household products and drugs.

## II. METHODOLOGY

Model selection is the process of selecting one final deep learning model from among a collection of candidate deep learning models for a training dataset. Model selection is a process that can be applied both across different types of models and across models of the same type configured with different model hyper parameters.

The types of classification models are:

*1)* Convolutional Neural Networks(CNNs)
*2)* Long Short Term Memory Networks(LSTMs)
*3)* Recurrent Neural Networks(RNNs)

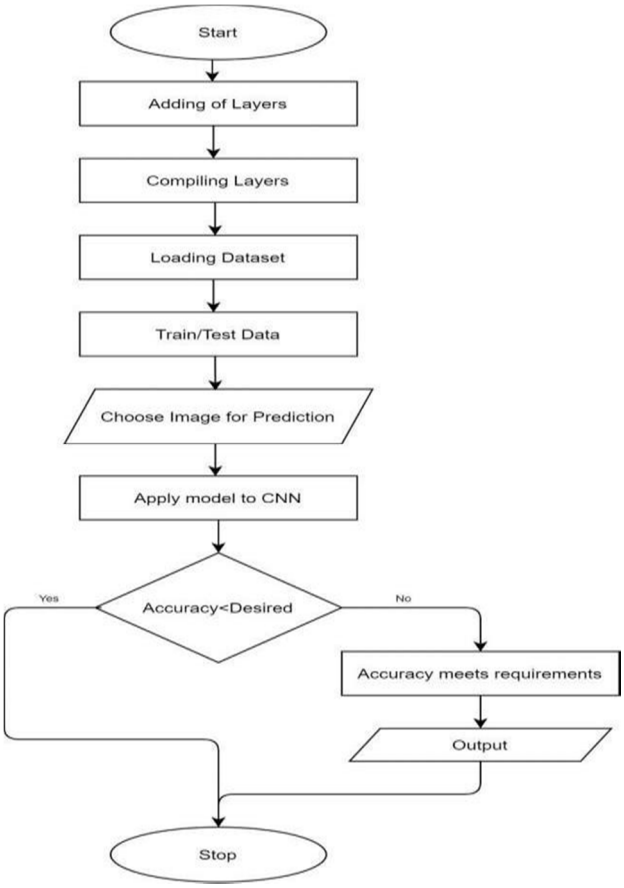



Fig: Flow Chart

*A. Data Collection*

The process of gathering data depends on the type of project. The data set can be collected from various sources such as a file, database, sensor and other sources and some free data sets from internet can be used. Dataset can also be collected manually depending on the requirements of the project. In this project, we have manually built dataset. The dataset consists of two folders: Training_images and Test_images. These folders consist of images of the people to whom the access is given and also to whom the access is denied.

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*B. Data Preprocessing*

Data pre-processing is a process of cleaning the raw data i.e. the data is collected in the real world and is converted to a clean data set. There are certain steps executed to convert the data into a small clean data set and make it feasible for analysis. This part of the process is called as data pre-processing.

Most of the real-world data is messy, like:

*1)* Missing Data
*2)* Noisy Data
*3)* Inconsistent Data

Some of the basic pre-processing techniques that can be used to convert raw data are:Conversion of Data, Ignoring the missing values, Filling the missing values,Detection of outliers.

*C. Model Selection*

*1)* *Train and Test:* Data For training a model we initially split the model into 2 sections which are "Training data" and "Testing data". The classifier is trained using "training dataset", and then tests the performance of classifier on unseen "test dataset". Training set: The training set is the material through which the computer learns how to process information. Training data set is used for learning and to fit the parameters of the classifier. Test set: A set of unseen data used only to assess the performance of a fully-specified classifier.

*2)* *Evaluation:* Model Evaluation is an integral part of the model development process. It helps to find the best model that represents the data and how well the chosen model will work in the future.To improve the model hyper-parameters of the model can be tuned and the accuracy can be improved. Confusion matrix can be used to improve by increasing the number of true positives and true negatives. The output is predicted by analysing the test data as input along with test data output and then the output is displayed.

*3)* *Interface:* A web interface is built to take input and display an output. Flask web framework is used to build a web interface and pickle library is used to integrate both model and web page.

## III. RESULTS AND DISCUSSION

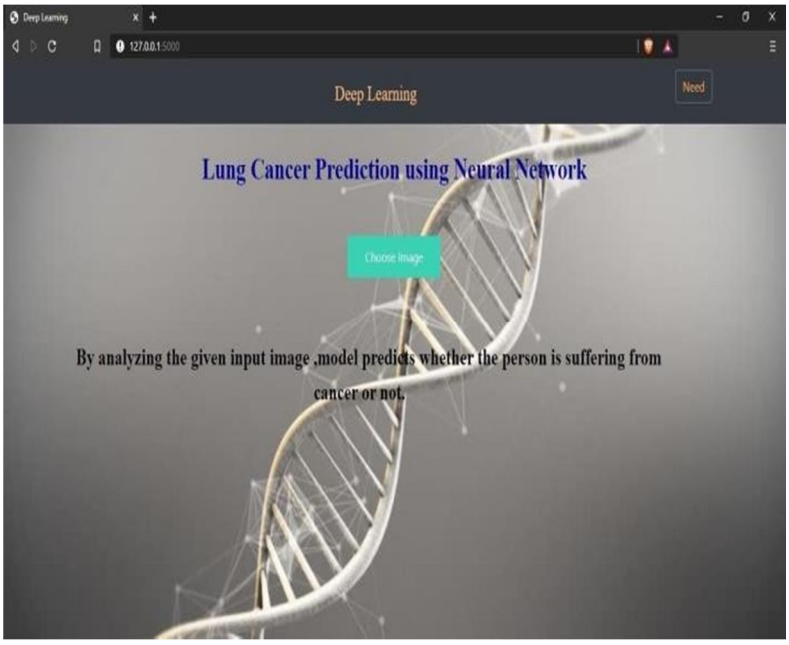



Fig: Home Page

- *Description:* The above snapshot displays the view of Home Page where user is provided with a button called Choose Image.

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Fig: Dialog box for selecting image

- *Description:* When the user clicks on select image button, a small dialog box appears. Where the user can select image for detection.

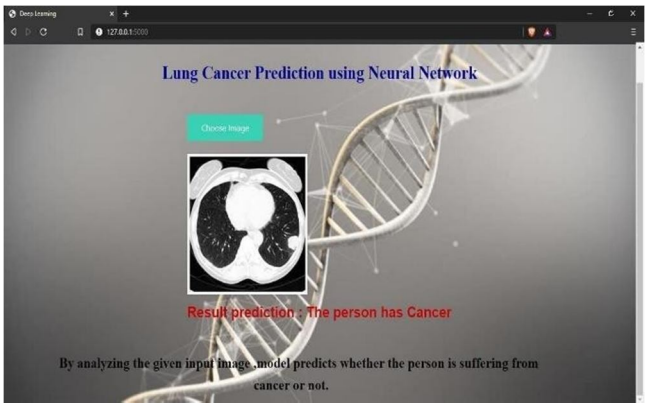


Fig: Output Screen 1

- *Description:* When the user clicks on predict button, the system provides the output saying the person has cancer.

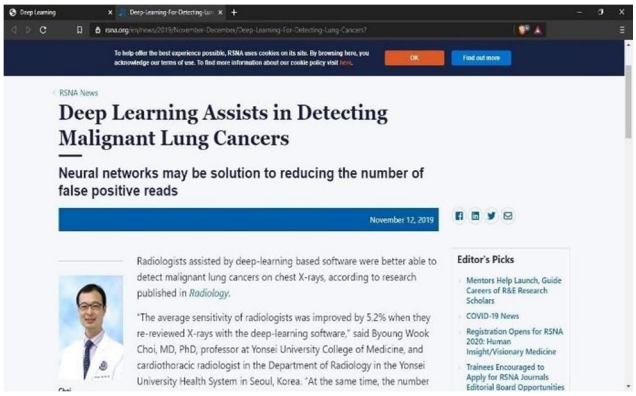


Fig: Page popped on clicking Need Button

- *Description:* When the users clicks on to the need button, it redirects to new page. Where information regarding deep learning for lung cancer has been provided.

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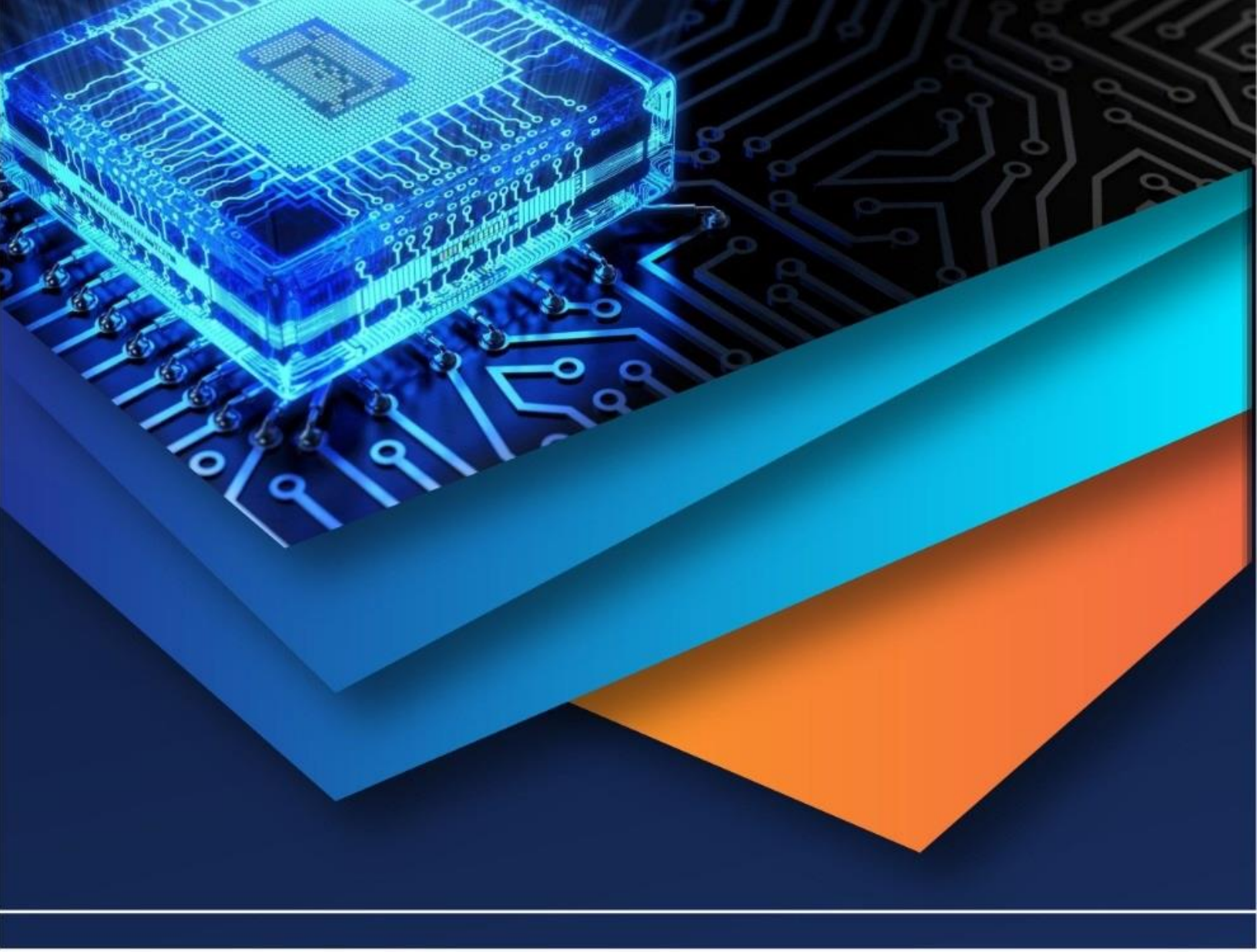
## IV. CONCLUSION

In this Project, an image processing technique is built to detect diseases at early stage of cancer so the patient can take the treatment at early stages. The time factor is major factor to discover the abnormal tissue in target x-ray images. The accuracy and the quality of image is one the major core factor of this research. The empirical results demonstrate the advantage of the proposed CNN system for detecting lung cancer. The main feature for detection of accurate image comparison are pixel percentage and mask labeling which gives us the indication that the process of detection this disease plays a very important and essential role to avoid serious stages and to reduce its percentage distribution in the world. Machine learning algorithms can be used for medical oriented research, it advances the system, reduces human errors and lowers manual mistakes.

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