Pathology Image Analysis For Lung Cancer Prediction Using Deep Learning

Presented by:

Team no:CSE-005

18UK1A0516- GANTA SUCHENDAR

18UK1A0525- KANKATI PRANITHA

18UK1A0535- MUSHIKA SAIRAM

18UK1A0576- JANAGANI VAMSHI KRISHNA

OUTLINE

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INTRODUCTION

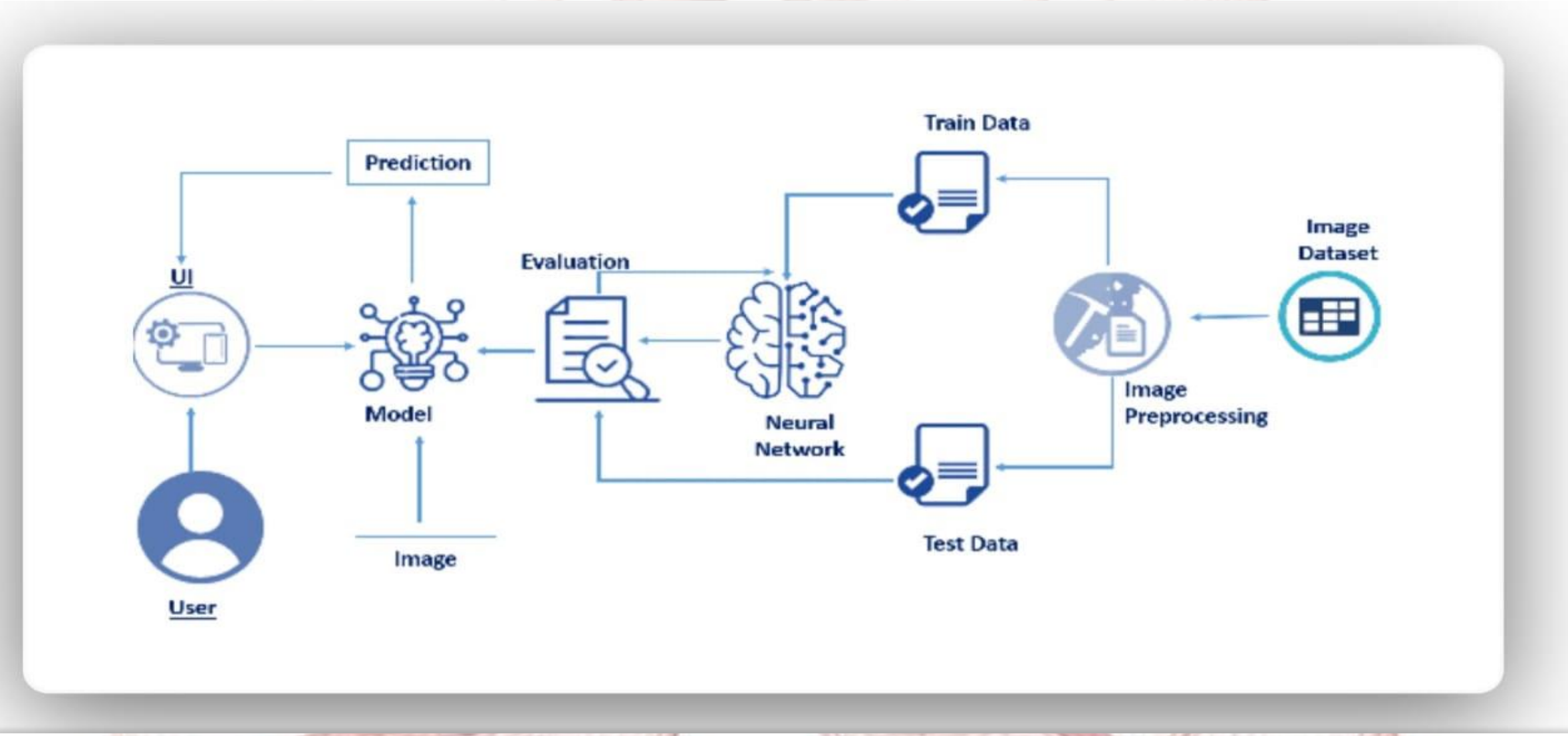
- The main objective of this project is to detect whether the tumor present in a patient's lung is malignant or benign using Convolution Neural Network (CNN)
- In a study published in Nature Medicine, researchers said that lung cancer caused an estimated 160,000 deaths in 2018, making it the most common cause of cancer death in the US. Lung cancer screenings that use low-dose tomography have been shown to reduce mortality by 20-43 percent, but there are still challenges that result in unclear diagnoses, subsequent unnecessary procedures, and high costs. Radiologists also usually have to look through dozens of 2D images within a single CT scan, and cancer can be hard to spot. Deep learning can offer a viable solution to these problems.

OBJECTIVES

By the end of this project you will:

- You will be get to know about the image processing.
- You will be able to understand Deep learning Architecture.
- Understand the concepts like Artificial neural network and Convolution neural network.
- You will Classify images using a Convolutional Neural Network.
- You will be able to know how to build a web application using the Flask framework.

TECHINICAL ARCHITECTURE



DATA COLLECTION

- Artificial Intelligence is a data hunger technology, it depends heavily on data, without data, it is impossible for a machine to learn. It is the most crucial aspect that makes algorithm training possible. In Convolutional Neural Networks, as it deals with images, we need training and testing data set. It is the actual data set used to train the model for performing various actions.
- We will be creating two folders one for training and the other for testing. Images present in the training folder will be used for building the model and the testing images will be used for validating our model.

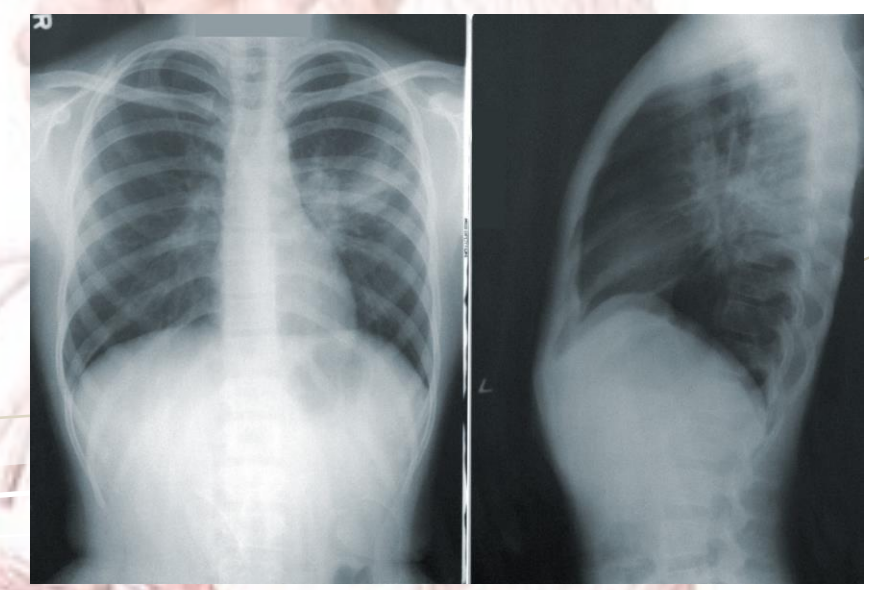
IMAGE PRE PROCESSING

Before training the model you have to preprocess the images and then feed them on to the model for training. we make use of Keras Image Data Generator class for image preprocessing.

Data augmentation in data analysis are **techniques used to increase the amount of data by adding slightly modified copies of already existing data** or newly created synthetic data from existing data.

Image Pre-processing includes the following main tasks

- Import Image Data Generator Library.
- Configure Image Data Generator Class.
- Applying Image Data Generator functionality to the trainset and test set.



MODEL BUILDING

Model building includes

- Import the model building Libraries
- Initializing the model
- Adding CNN Layers
- Adding Dense Layers
- Configure the Learning Process
- Training the model
- Saving the model

MODEL BUILDING DESCRIPTION

Import Libraries

We have to define how our model will look and what it requires.

Initializing The Model

The Sequential class is used to define linear initializations of network layers

Add CNN Layers

It is one of the building blocks of a CNN and is used for extracting important features from the image.

Adding Dense Layer

Configuring The Learning Process

This means to compile () method of the Sequential model class. Compilation requires 3 arguments: an optimizer, a loss function, and a list of metrics.

Training The Model

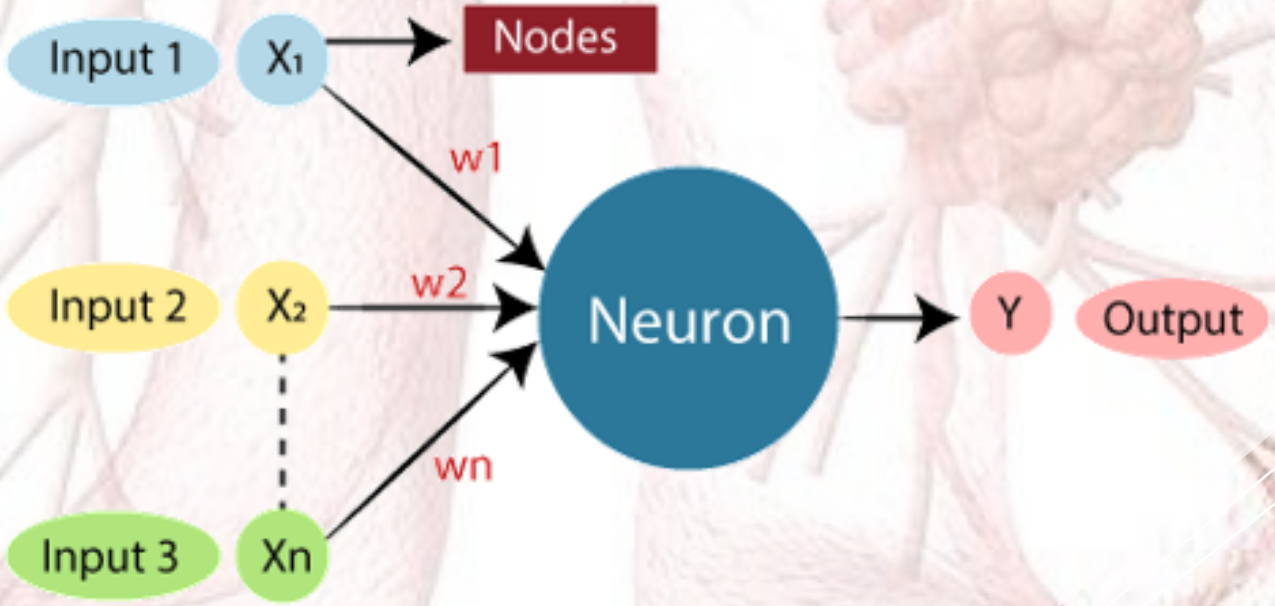
we have training data and a fully configured neural network to train with loaded data.

Save The Model

Your model is to be saved for future purposes.

ARTIFICIAL NEURAL NETWORK

The term "**Artificial Neural Network**" is derived from Biological neural networks that develop the structure of a human brain. Similar to the human brain that has neurons interconnected to one another, artificial neural networks also have neurons that are interconnected to one another in various layers of the networks. These neurons are known as nodes.



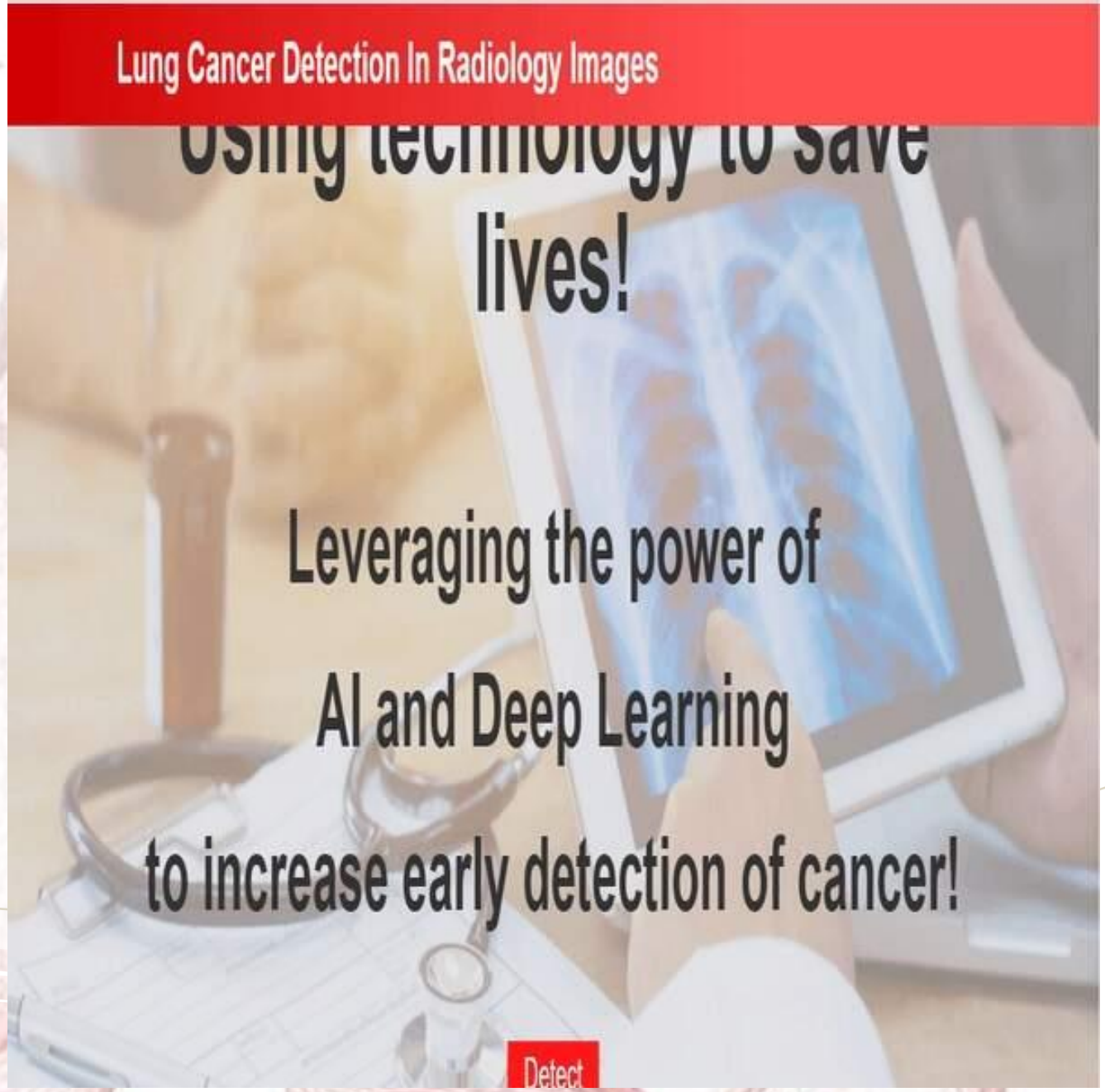
CONVOLUTIONAL NEURAL NETWORK

- A convolutional neural network (CNN) is a type of artificial neural network used in image recognition and processing that is specifically designed to process pixel data. ... A CNN uses a system much like a multilayer perceptron that has been designed for reduced processing requirements.

- CNN is a neural network that has one or more convolutional layers and are used mainly for **image processing, classification, segmentation and also for other auto correlated data**. A convolution is essentially sliding a filter over the input.

OUTPUT

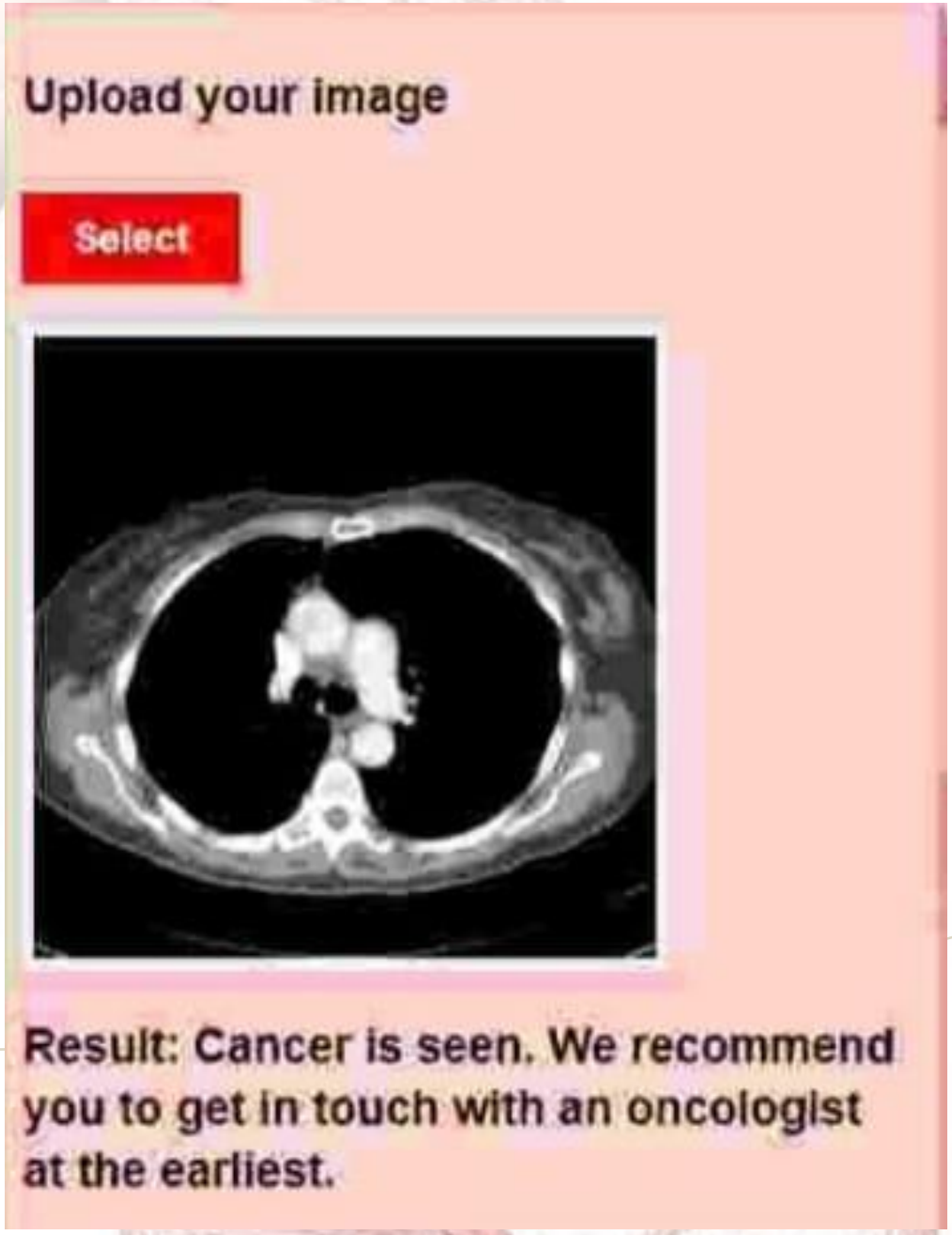
With the help of Artificial Intelligence and Deep Learning we are going to detect the cancer in the earlier stage
click the detect button to upload the images



RESULT

The main motto is

"use technology to save lives"



SOFTWARE REQUIREMENTS

- Anakonda navigator
- Jupyter notebook
- Machine learning tools: Numpy,
  Matplotlib,
  Tensorflow,
  Keras.

CONCLUSION

- In this project we have presented the lung cancer prediction using Deep learning
- So, we used artificial neural networks and convolution neural networks to train these images and build a Deep learning model
- For better results we applied CNN layers.