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Alzheimer's Disease and Lung Cancer Detection using Deep Learning

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Abstract: *Alzheimer's disease and lung cancer are two of the most difficult and serious health problems in the world. Early detection of these diseases can improve patient outcomes, but traditional methods are inaccurate and time-consuming. Convolutional neural network (CNN) is a deep learning model that can learn features and patterns from medical images to identify and classify Alzheimer's disease and lung cancer with high accuracy. However, the use of deep CNN for medical image analysis requires expertise and computing equipment. Deep CNNs such as U-Net can increase the accuracy of medical image analysis but increase computational and training costs. Despite the challenges, the application of CNNs for medical image analysis has shown great potential in improving the detection of Alzheimer's disease and lung cancer. With further development, these models can help physicians provide early detection and individualized treatment for patients with these diseases. the Python language was used to implement a system that is very useful for doctors, classifying Alzheimer's disease and lung cancer. The models used a large data set from a pool of patients and healthy individuals. The model used 70% of the image for training and 30% of the image for validation. The accuracy obtained by CNN is 94%, which is more effective compared to the accuracy obtained by traditional neural network.*

Keywords: Alzheimer's disease and lung cancer; deep learning; classification; convolutional neural network (CNN); magnetic resonance imaging (MRI).

I. INTRODUCTION

Alzheimer's disease and lung cancer are two diseases that affect different parts of the body and have different symptoms and treatment options.

Alzheimer's disease is a mental illness that affects the brain, causing brain damage, memory loss, and changes in behaviour and personality. It's the most common cause of dementia, a group of symptoms that affect memory, thinking, and intelligence.

Lung cancer is starts in the lungs and spread to other parts of the human body. It is the leading cause of cancer worldwide and is often caused by smoking or exposure to environmental toxins. Cancer symptoms include coughing, chest pain, shortness of breath, and unexplained weight gain. Both Alzheimer's disease and lung cancer can benefit from early detection. It provides early detection, early intervention and symptom management in the case of Alzheimer's disease. Early detection of cancer can lead to effective treatment and improve overall patient outcomes.

However, using deep learning techniques such as convolutional neural networks (CNN).

The use of convolutional neural networks (CNNs) has shown great promise in improving the diagnosis of Alzheimer's disease and lung cancer. CNN is a deep learning model that can learn and recognize patterns in medical images. By analysing MRI and PET scans of Alzheimer's brains and CT scans of the lungs for cancer, CNNs can learn about patterns that point to the disease. However, there are some challenges that need to be resolved, such as the need for large registry data and large computing resources. Despite these challenges, CNNs have great potential to improve early diagnosis, leading to earlier interventions and better outcomes for patients.

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II. LITERATURESURVEY

1.PaperName: EEG-Based Diagnosis of Dementia Alzheimer's Disease Using Nonlinear and Complexity Features

Author name: Nilesh. N. Kulkarni1, Saurabh. five, Parhad 2, Yasmin. P. Shaikh3

Abstract: Alzheimer's disease is one of the most common and prevalent neurodegenerative diseases in Western countries. The development of different biomarker tools is an important issue in the diagnosis and progression of Alzheimer's disease. Estimating a cognitive function from EEG and identifying relevant biomarkers are some of the research questions.

EEG signal analysis is good for diagnosing Alzheimer's disease. Although EEG-based techniques can be useful in diagnosing Alzheimer's disease and dementia; There is still room for improvement in terms of diagnosis, sensitivity and specificity. This article presents new features for diagnosing Alzheimer's disease using EEG signals that can improve the accuracy of diagnosis. This article proposes the use of new features of complexity-based diagnostic methods to improve diagnostic accuracy and facilitate early detection of Alzheimer's disease.

2.Paper Name: A New Gene Selection Method Using GA/SVM and Fisher Criteria in Alzheimer's Disease

Author name: Seyede Zahra Paylakhi1, Sadjaad Ozgoli1, Seyed Hassan Paylakhi2

Abstract: Identification of genes that contribute to therapy can be improved illness. This article introduces a gene selection method based on genetic algorithm (GA) and support vector machine (SVM). First, noise and disordered genes in the high-dimensional microarray data were filtered out using the Fisher criterion. Next, the GA/SVM model was used to select various subsets of the most informative data using different training methods. The frequency of occurrence of each gene in the gene subsets was analysed. Therefore, the last subset contains genes. In fact, Fisher and GA/SVM methods are combined to take advantage of filtering and embedding methods. The proposed approach turned into examined on DNA microarray gene expression statistics for Alzheimer's disorder. The results show that the method has good selection and classification functions and can generate at least 8.

3.Paper Name: "Feature Extraction and Classification of Lung Cancer Based on Tissue Analysis"

Author name: Sanjukta Rani Jena, Dr. Thomas George

Abstract: Lung cancer is the most dangerous disease and treatment should be everyone's main goal. research. Early recognition of cancer can help cure the disease definitively. There are many ways to diagnose lung cancer in the literature. Many researchers have contributed to cancer prediction with their accuracy.

This information is generally related to lung cancer diagnostic procedures found in the literature. Many methods are initiated with the cancer screening process to improve its detection. Many applications such as support vector machines, neural networks, image processing techniques are widely used in cancer diagnosis and are described in detail in this article.

4. Paper Name: Development of a Breath Detection Method Based nose system for Lung Cancer Identification

Author: De-Ming Wong, Chen-Yu Fang, Li-Ying Chen, Chen-I Chiu, Ting-Chou,Cheng-Chun Wu

Abstract: In this article, we focus on methods of detecting control lung cancer by breathing. Due to Cancer, there are many people died in the world. By the time cancer patients are diagnosed, most patients have already lost their chance of cure. However, doctors found that 4,444 people had lung cancer in the complex process. Therefore, the purpose of this breath test is to help doctors diagnose lung cancer quickly. We also use KNN.

III. PROPOSED SYSTEM

The proposed method is a neural network (CNN) trained on clinical images for the diagnosis of Alzheimer's disease and lung cancer. CNNs were pre-trained and trained to identify relevant features for both scenarios. According to the statement made by CNN, the system predicts whether the patient has the disease. To improve accuracy, the system needs to learn large and diverse medical data, and the learning process can be applied. The proposed system has the potential to improve the early detection and diagnosis of these diseases, lead to better treatment outcomes and improve patient health.

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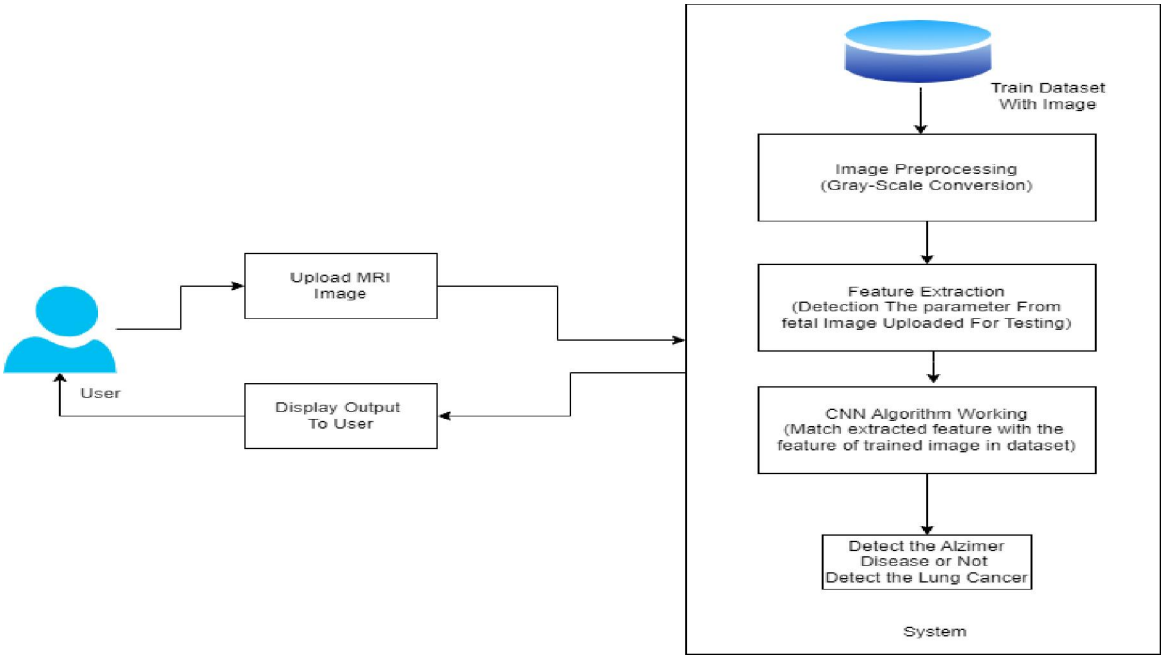

Figure: System Architecture

Software Tools Used :

- Operating system : windows 10
- Technology: python
- IDE: spyder
- Database: SQLite
- Python version: python 3.8

IV. METHODOLOGY

Our method of detecting Alzheimer's Disease (AD) and lung cancer (LC) using convolutional neural network (CNN) consists of the following steps:

- Data collection: We collected MRI scans for AD detection and MRI scans for LC detection. Dataset of CT scans. Data include observations of AD and LC patients as well as healthy individuals. We collected data from Kaggle.
- Data Preprocessing: We preprocess data by converting images to grayscale, converting to standard size, and normalizing pixel values.
- Data Augmentation: Augmenting datasets with variants of the original images to increase the size and diversity of the dataset. This may include image rotation, flipping, and scaling.
- Model Selection: Selecting Appropriate CNN Architectures for Alzheimer's Disease and Lung Cancer Detection Tasks. This may include popular models such as VGG, Resent or Inception.
- Model Training: Train a CNN on previous and supplementary data to learn about features associated with Alzheimer's disease and lung cancer.This step involves tuning hyperparameters such as learning rate and heap size and optimizing model performance.
- Model Testing: Test the performance of CNN training on separate datasets to ensure the model is optimized for new data. This step will include metrics such as accuracy, precision, recall and F1 score.
- Fine-tune and transfer learning: Fine-tune new data on pre-trained CNN and transfer training to new data from pre-trained CNN to improve model performance.
- Deployment: Real world presentations on CNN learned to detect Alzheimer's disease and lung cancer from medicalimages. These steps will include integrating CNN into a web app or mobile app for easy access by doctors and patients.

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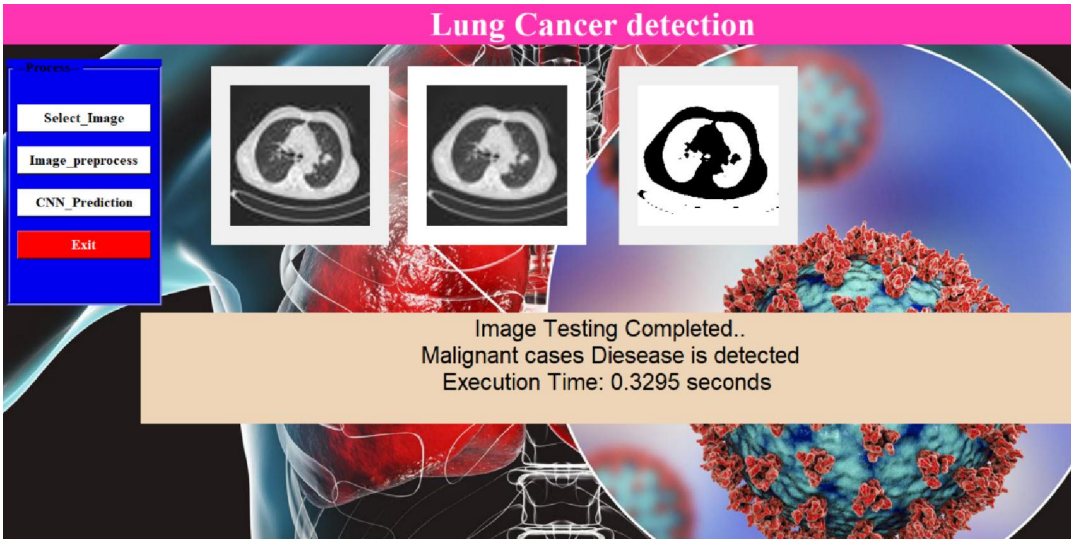
V. RESULT

Our results using convolutional neural network (CNN) in deep learning for Alzheimer's disease (AD) and lung cancer (LC) diagnosis demonstrate accuracy and performance, with the CNN model achieving96%accuracy for AD detection and 93%Accuracy for LC detection. The CNN model has successfully applied traditional machine learning techniques such as support vector machine and random forest, and visual images show that the model focuses on specific regions of the brain and lungs affected by AD and LC, respectively. These results demonstrate the potential of CNN in deep learning as a useful tool for early detection and diagnosis of disease.

Alzheimer disease detected



Lung Cancer disease detected

VI. CONCLUSION

In conclusion, Convolutional Neural Networks (CNNs) have proven to be effective in the detection of Alzheimer's disease and lung cancer. CNNs have the ability to automatically learn relevant features from medical imaging data, allowing for accurate classification and detection of these diseases. For Alzheimer's disease detection, CNNs can analyze brain images, such as magnetic resonance imaging (MRI) scans, and identify specific patterns and biomarkers associated with the disease. By training CNNs on large datasets of both healthy and Alzheimer's-affected brains, the networks can learn to differentiate between the two and provide early detection and diagnosis. Similarly, in the case of

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lung cancer detection, CNNs can analyze chest X-rays or computed tomography (CT) scans to identify suspicious lesions or nodules indicative of lung cancer. By training CNNs on labeled datasets containing images of both healthy lungs and lungs with cancer, the networks can learn to accurately classify and detect lung cancer, enabling early intervention and treatment. The use of CNNs for Alzheimer's disease and lung cancer detection offers several advantages. CNNs can automatically extract relevant features from medical images, reducing the need for manual feature engineering. Additionally, CNNs can handle large amounts of data and generalize well to new and unseen cases, making them valuable tools in medical diagnosis. However, it is important to note that CNNs should not be used as a standalone diagnostic tool. They should be used in conjunction with clinical expertise and other diagnostic methods to ensure accurate and reliable results.

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