PROPOSAL

LUNG CANCER DETECTION

Prepared For :

AI Project

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BACKGROUND

Cancer has become increasingly common due to technological advancements and increased radiation exposure. Various types of cancer, such as skin, breast, prostate, blood, colorectal, kidney, and lung cancer, affect many people. Among these, lung cancer has a particularly high mortality rate and is often diagnosed only in advanced stages. Non-small cell lung cancer (NSCLC) is the most common type, accounting for 80-85% of all lung cancer cases. Advances in digital image processing and artificial intelligence have significantly aided medical image analysis and computer-aided diagnosis (CAD). Numerous research efforts are focused on improving the detection and prediction of cancerous tissues.

DESCRIPTION

Despite advancements, cancer remains a serious health concern. Lung cancer, particularly deadly and often difficult to diagnose early, is a prime example. This study proposes using Convolutional Neural Networks (CNNs) to analyze CT scans for faster, more accurate lung cancer detection. The CNN achieved high training and validation accuracy (96.11% and 82.33%, respectively), suggesting its potential to improve diagnosis and patient outcomes

OBJECTIVE

Our project aims to improve early diagnosis of lung cancer, a critical factor in successful treatment, by leveraging deep learning, a powerful subset of AI. We will develop a high-accuracy model for detecting lung nodules in chest CT scans, aiming to reduce false positives and improve screening efficiency, thereby minimizing unnecessary biopsies. By implementing automated lung nodule detection, we will enhance radiologists' capabilities and enable earlier lung cancer diagnosis through the identification of suspicious nodules. Additionally, we will evaluate the cost-effectiveness of integrating this deep learning model into existing lung cancer screening programs. Ultimately, this project will contribute to the development of AI-powered tools for improving public health outcomes in lung cancer detection and treatment.

METHODOLOGY

A methodology for lung cancer detection in CT scans using a Convolutional Neural Network (CNN). We will employ a pre-trained VGG-16 model, renowned for its strong image recognition capabilities, to extract valuable features from the images. To ensure model robustness and prevent overfitting, we will use k-fold cross-validation, splitting the data into multiple folds for training and validation. Following feature extraction by VGG-16, we will design a custom neural network using TensorFlow. This network will include a Flatten layer to transform the extracted features into a one-dimensional vector, a Dropout layer with a 50% dropout rate to prevent overfitting, a Dense layer with 32 nodes and a ReLU activation function to introduce non-linearity, and a single-node Dense layer with a sigmoid activation function to output the predicted class (cancerous or healthy). To enhance the model's generalizability to real-world scenarios, we will implement data augmentation techniques, increasing dataset size and diversity through zooming, shearing, and adjusting image brightness. Additionally, data normalization will be performed to prevent overfitting during training. The training process will utilize a dataset containing 234,300 images, categorized as positive (cancerous) or negative (healthy), for training, testing, and validation purposes.

EXPECTED OUTCOME

1. Improved early diagnosis of lung cancer.
2. High-accuracy detection model for lung nodules.
3. Reduced false positives and unnecessary biopsies.
4. Enhanced support for radiologists.
5. Cost-effective integration into screening programs.
6. Advancement of AI-powered public health tools.