Introduction to AI

Project

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Tumor Detection

Deep Learning model to predict cancer based on chest CT scan images.

Introduction

- Lung problems are a pressing global health issue, impacting individuals across all age groups. From chronic respiratory diseases to lung cancer, these conditions significantly affect quality of life.
- with smoking being the primary risk factor, and with more than 1.1 billion smoker around the world.
- These problems are hard to detect at early stages leading to poor prognosis and limited treatment options.

This technology allows early detection and timely intervention, improving treatment outcomes and increasing the chances of successful recovery.

Objectives

- Detect cancer tumor on chest CT scan images.

- Maximize the efficiency by achieving high accuracy on a low scale of train data.

- Increasing base VGG16 efficiency by proposing some adjustments.

Context

- Cancer Detection System would be helpful in the health care facilities such as hospital, diagnostic center, or radiology clinic.
- By only using chest CT scans and the consultation of a healthcare provider.
- The model helps recognizing a tumor and classify it.

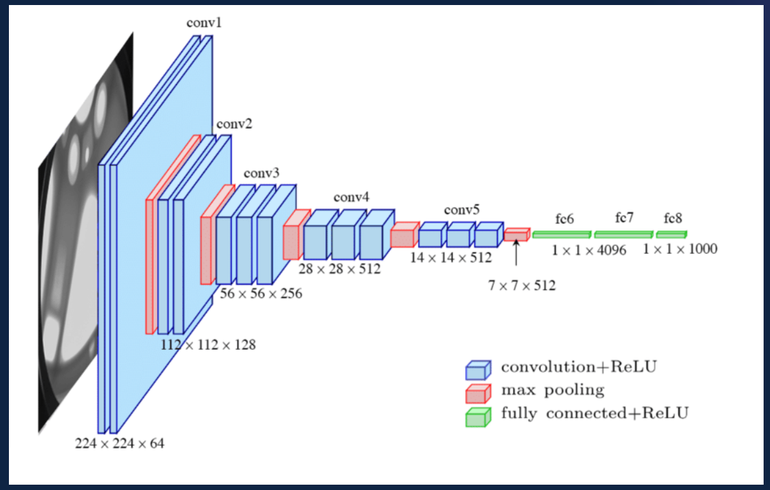
Methods

Image processing & manipulation

- Using Pillow and OpenCV, we were able to change the color mode to grey scale, adjust the brightness, contrast, and the size of images.
- Making it ready to be entered to the model.

Feature Extraction & Classification

- Using a modified VGG16 CNN architecture



Dataset

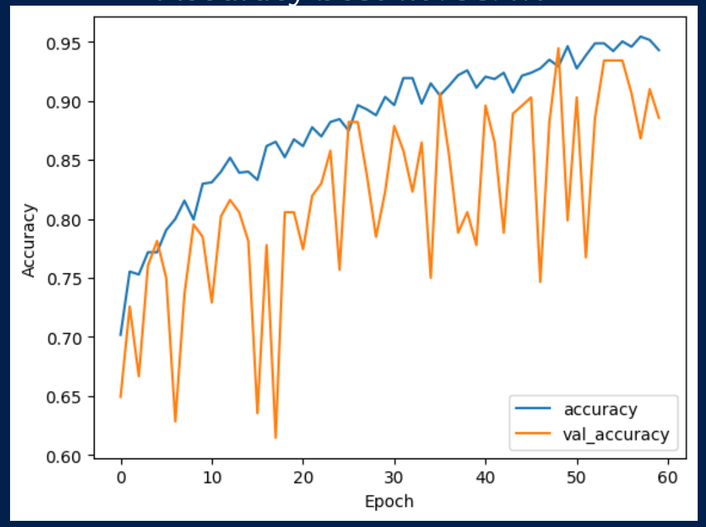
- We will obtain the dataset from Kaggle using the Kaggle API client.
- The dataset consists of chest CT scan images that will be used for training, validating, and testing the model.
- We then label the images based on their cancer types and map the cancer types to numerical values for model training.

Results

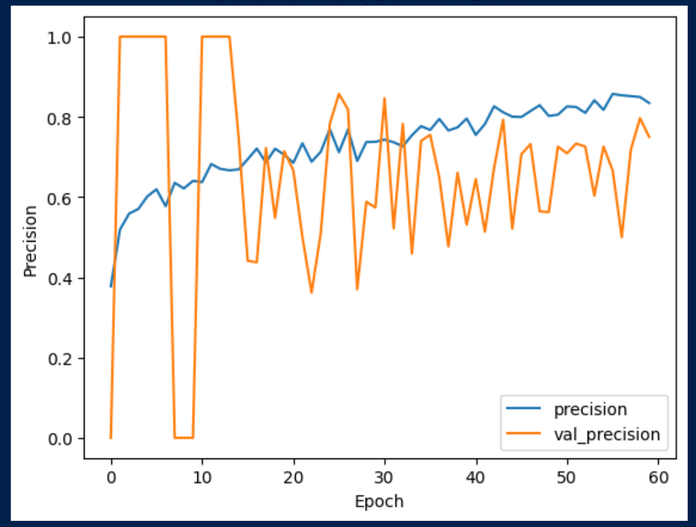
- our model accuracy: 95.1% , validation: 90.9% , test: 80%
- VGG16 accuracy: 81.7% , validation: 77.4% , test: 79.3% (results provided from other people's scripts)
- resnet50 accuracy: 73% , validation: 80.0% , test: 81.6% (results provided from other people's scripts) (can conclude that resnet favors validation as it focuses on generalization)

Results

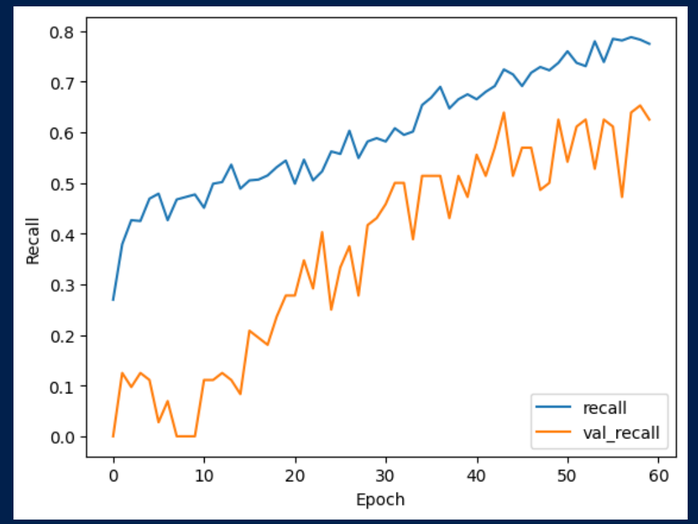
Accuracy best-fit : 95.4%



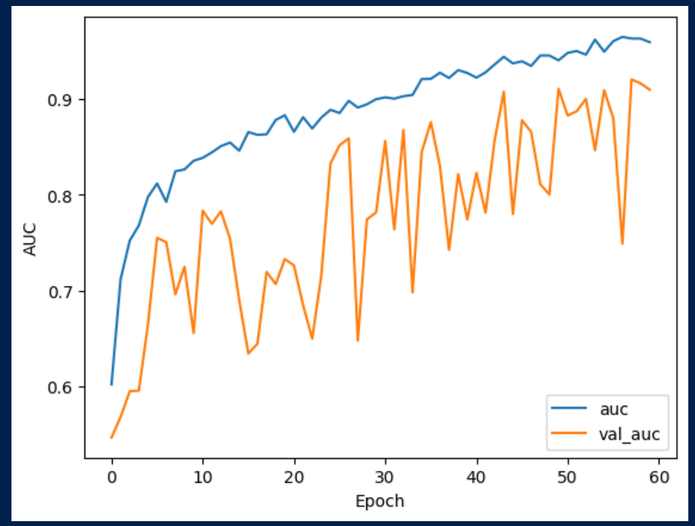
Precision best-fit : 91%



Recall



auc



loss