

Lung Cancer Classification Using Transfer Learning with Xception Model

Abstract—This project report presents a deep learning-based approach for classifying lung cancer types using the Xception transfer learning model. The dataset includes four classes: normal, adenocarcinoma, large cell carcinoma, and squamous cell carcinoma. The model was trained on a dataset of 613 training images and validated using 315 test images. The proposed model achieved a high accuracy, showcasing the effectiveness of transfer learning for medical image classification tasks.

I. INTRODUCTION

Lung cancer is a leading cause of cancer-related deaths worldwide. Early and accurate diagnosis is crucial for effective treatment. This study leverages transfer learning using the Xception model to classify lung cancer types based on CT scan images. The primary goal is to improve diagnostic accuracy while reducing the computational complexity of training models from scratch.

II. METHODOLOGY

A. Dataset Preparation

The dataset used for this study was stored on Google Drive and consisted of four classes:

- Normal
- Adenocarcinoma (left lower lobe)
- Large Cell Carcinoma (left hilum)
- Squamous Cell Carcinoma (left hilum)

A total of 613 training images and 315 test images were resized to 350×350 pixels. Data augmentation techniques such as horizontal flipping and rescaling were applied using TensorFlow's `ImageDataGenerator`.

B. Model Architecture

The Xception model, pre-trained on ImageNet, was used as the base model. Its weights were frozen, and the following additional layers were added:

- Global Average Pooling layer
- Dense layer with four output nodes (softmax activation)

The model was compiled using the Adam optimizer, categorical cross-entropy loss, and accuracy as the evaluation metric.

C. Training and Evaluation

The model was trained using the following parameters:

- Batch size: 8
- Epochs: 50
- Callbacks: Learning rate reduction, early stopping, and model checkpointing

III. RESULTS

The final model achieved the following accuracies:

- Training Accuracy: 99.5%
- Validation Accuracy: 96.2%

A. Training Curves

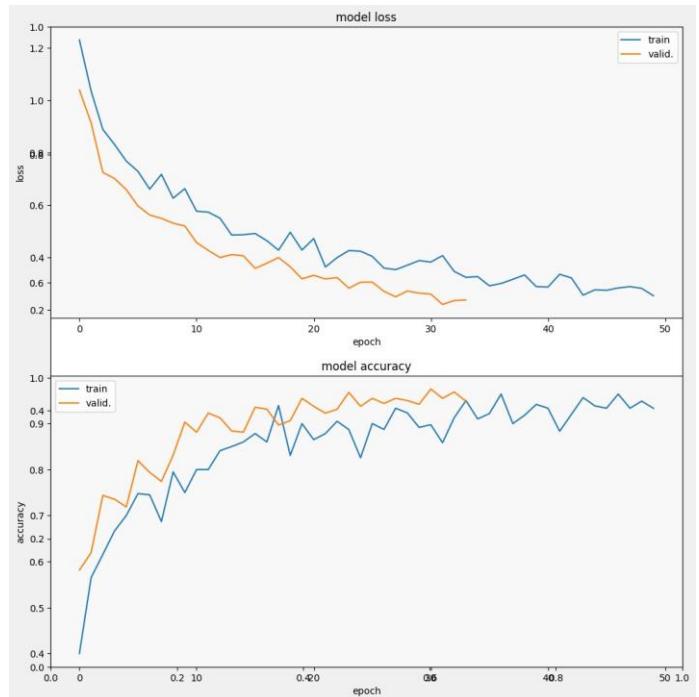


Fig. 1. Training and validation accuracy and loss curves.

B. Prediction Results

Sample predictions on test images are displayed below:

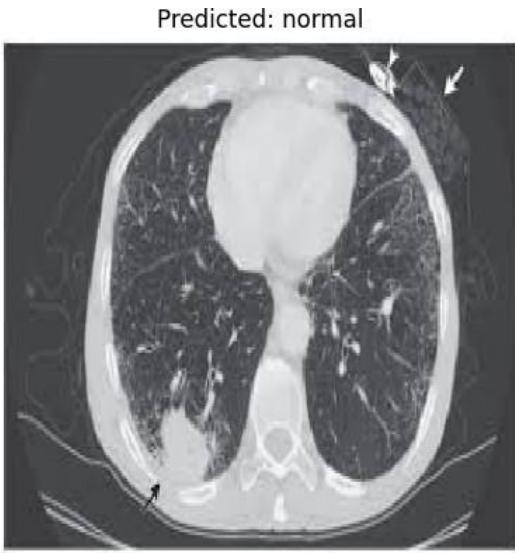


Fig. 2. Predicted: Squamous Cell Carcinoma

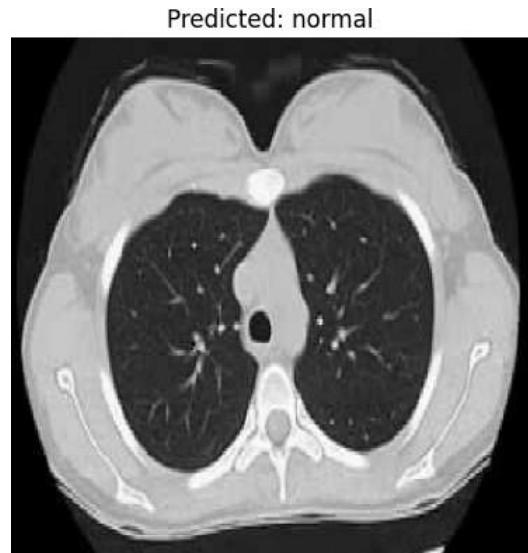


Fig. 4. Predicted: Normal

IV. CONCLUSION

This study demonstrates the effectiveness of transfer learning for classifying lung cancer types. The Xception-based model achieved high accuracy, making it a promising tool for aiding radiologists in lung cancer diagnosis. Future work includes expanding the dataset and exploring other deep learning architectures to further enhance performance.

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REFERENCES

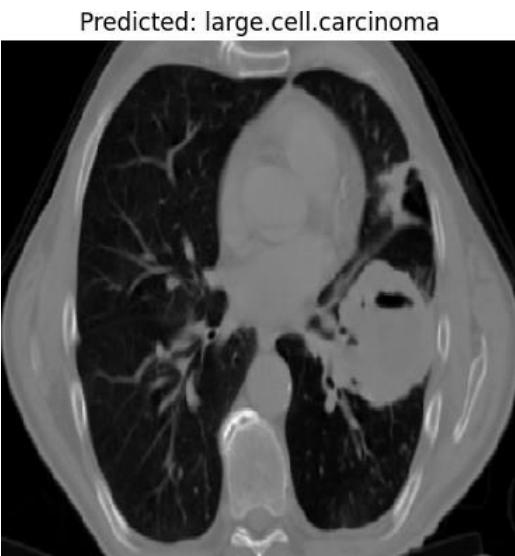


Fig. 3. Predicted: Large Cell Carcinoma