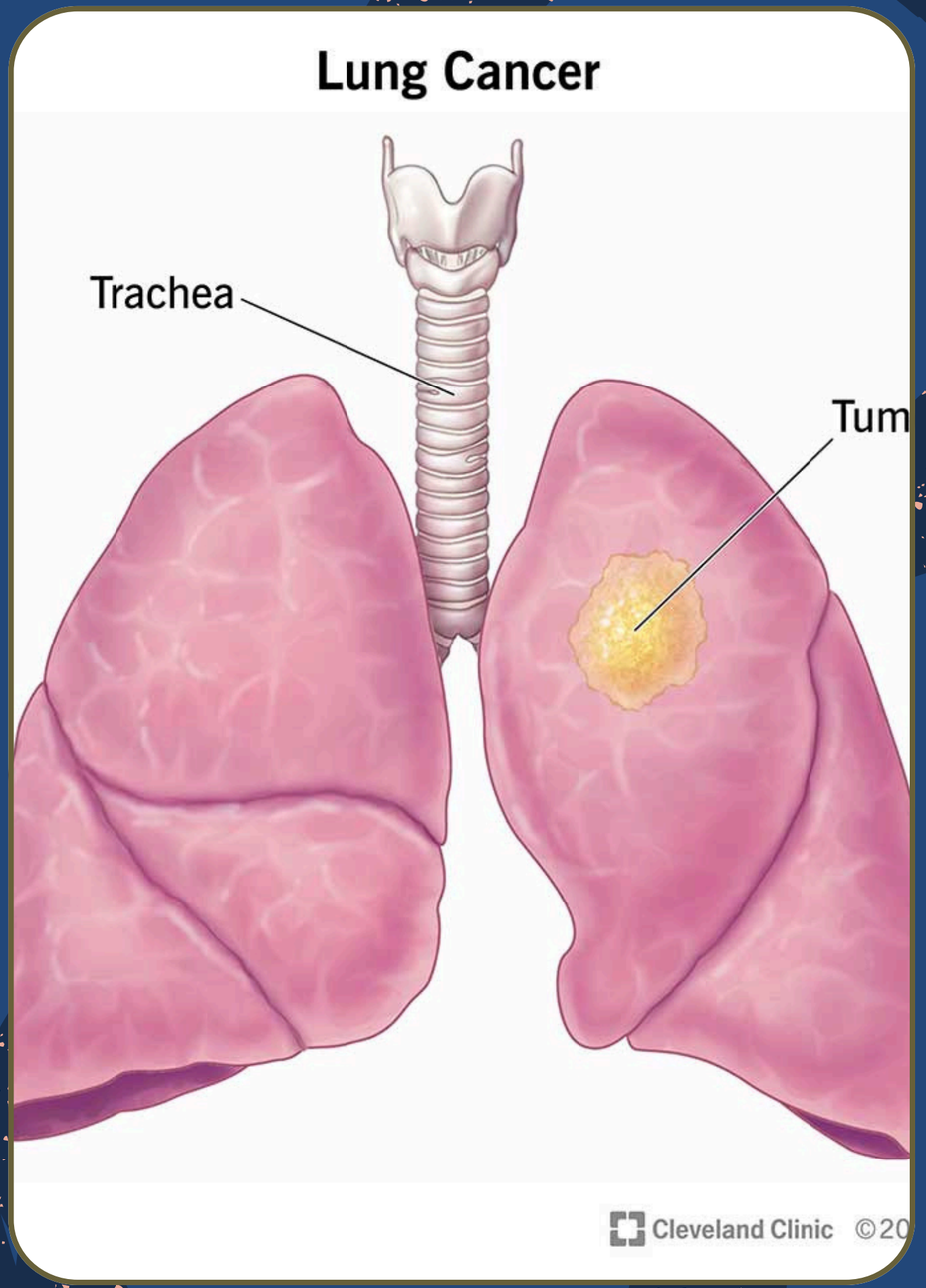
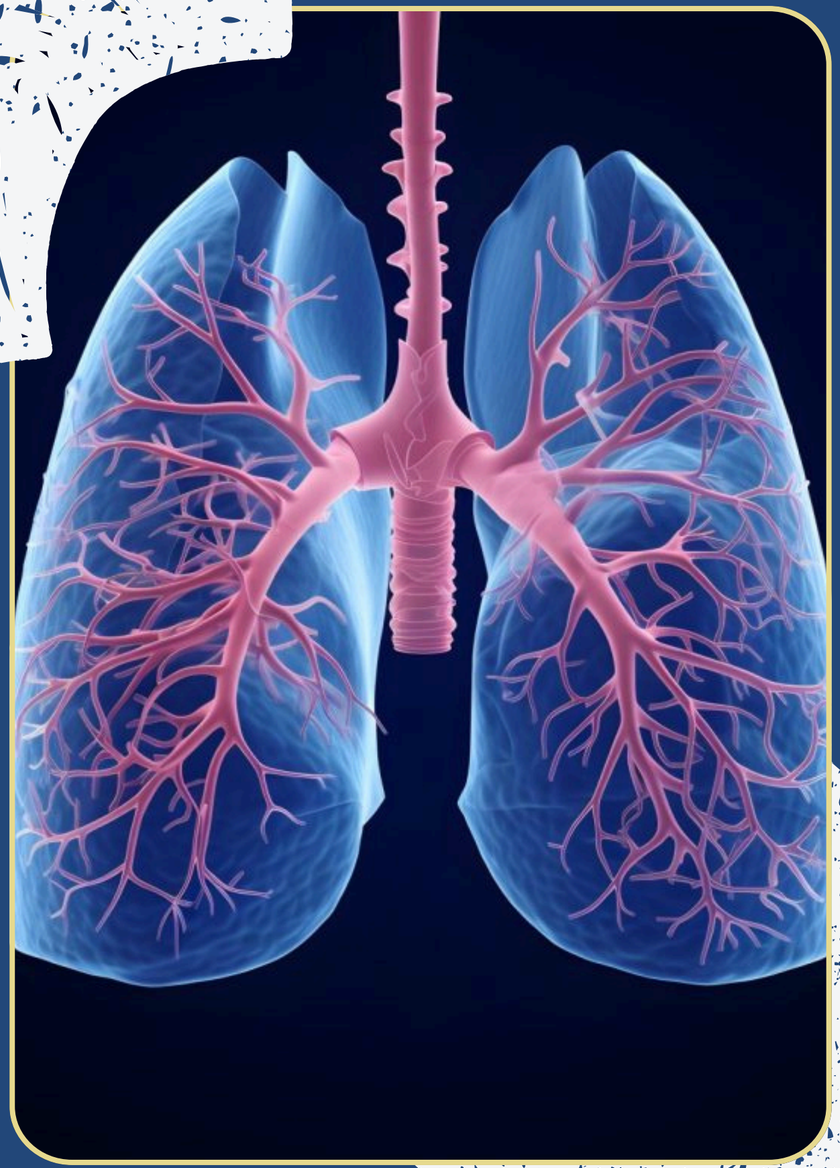
Lung Cancer
Detection





TITLE : Lung Cancer Detection Using Deep Learning

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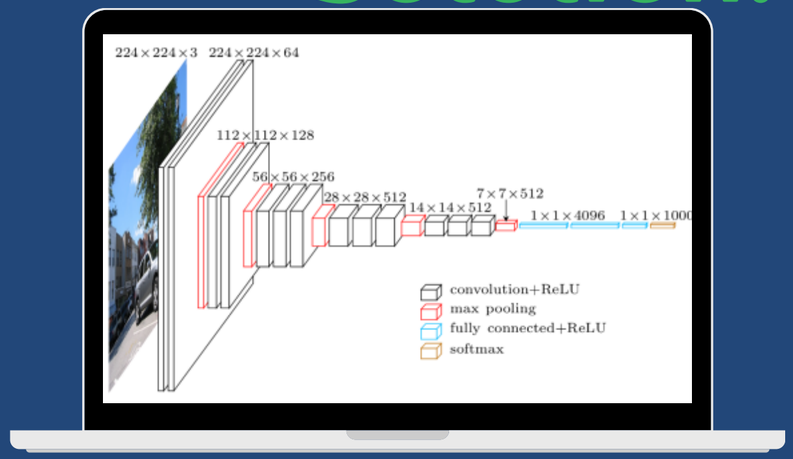
INTRODUCTION

Problem Statement:

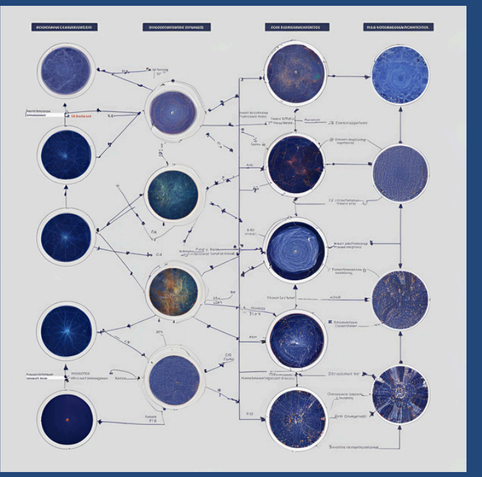
- Late-stage diagnosis increases mortality
- Manual radiologist interpretations can miss early-stage cancers.

Solution:



- Use CNN models for automated and precise lung cancer detection.
- Early detection improves survival rates and reduces healthcare costs.

OBJECTIVES



- Implement and evaluate five CNN models:
  - VGG16, VGG19, InceptionV3, EfficientNetB0, DenseNet
- Optimize models using transfer learning and preprocessing techniques
- Determine the best-performing model for lung cancer detection.

Literature Review

Key Studies and Findings:

- Deep learning AI systems achieved sensitivities of 94.3% (benign), 96.9% (cancer), and 92.0% (metastases), comparable to or better than radiologists.
- Combined watershed segmentation and SVM for lung cancer detection, achieving 92% accuracy.
- SVM and CNN classifiers showed 95.56% and 92.11% accuracy, respectively, for lung cancer prediction.
- CNN-based systems like AlexNet achieved 99.52% accuracy in lung CT image classification.
- Reviewed techniques like CNN, ResNet, and U-Net with accuracy rates over 96%.

Implications:

- Deep learning is effective in improving diagnostic accuracy and automating lung cancer detection.
- Literature highlights the need for robust models that balance accuracy and computational efficiency.

Methodology

Dataset : Public dataset (e.g., LIDC-IDRI).

Preprocessing : Image normalization, resizing, augmentation (rotation, flipping, contrast).

Model Architectures :

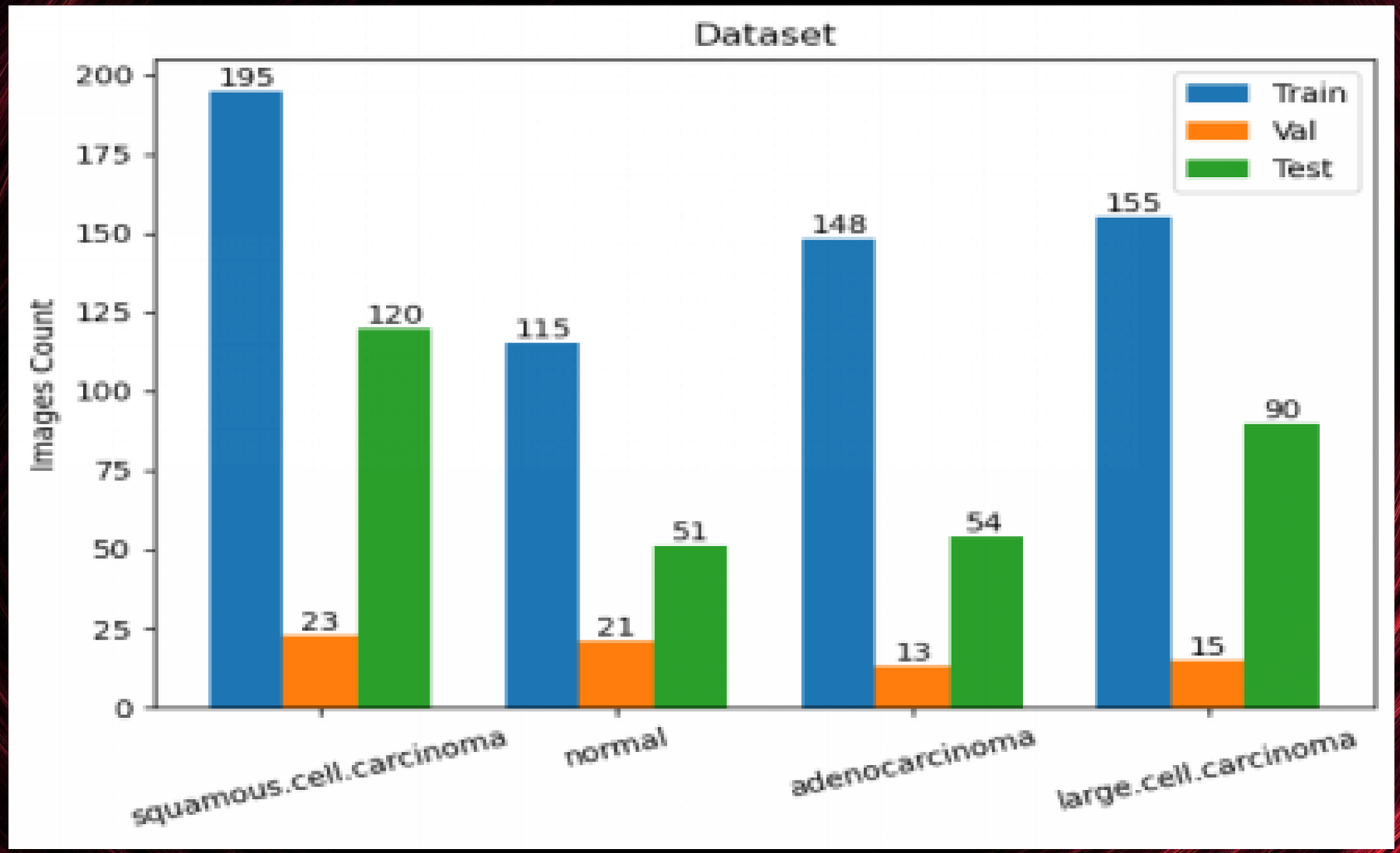
VGG16 & VGG19 : Pre-trained on ImageNet, fully connected layers added.

EfficientNetB0 : Compound scaling for optimized resource use.
DenseNet: Efficient feature reuse.

InceptionV3 : Multi-scale feature extraction.

Optimization : EarlyStopping, ModelCheckpoint, Learning Rate Reduction.

Methodology



Model Comparison

Model	Training Accuracy	Validation Accuracy	Training Loss	Validation Loss
VGG16	60.0%	60.0%	0.4932	1.0142
InceptionV3	72.5%	68.5%	0.3671	0.8321
EfficientNet B0	85.0%	83.0%	0.1534	0.4352
VGG19	98.0%	60.0%	0.1200	1.0100
DenseNet	50.0%	50.0%	0.7000	1.2000

Results

- **Best Model:** EfficientNetB0
  - Highest validation accuracy (83%).
  - Optimal balance between accuracy and computational efficiency.
- **Challenges:** VGG19 showed overfitting despite high accuracy.**(98%)**

Conclusion

- Deep learning models improve lung cancer detection accuracy.
- EfficientNetB0 is the most suitable for clinical applications.
- **Future Work:**
  - Address overfitting in VGG19.
  - Test on larger datasets for real-world validation.

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THANK YOU