AMRITA VISHWA VIDYAPEETHAM
DEEMED TO BE UNIVERSITY

Lung Cancer and Drug Response Prediction

Molecular biology & basic cellular physiology
Ethics, innovative research, businesses & IPR

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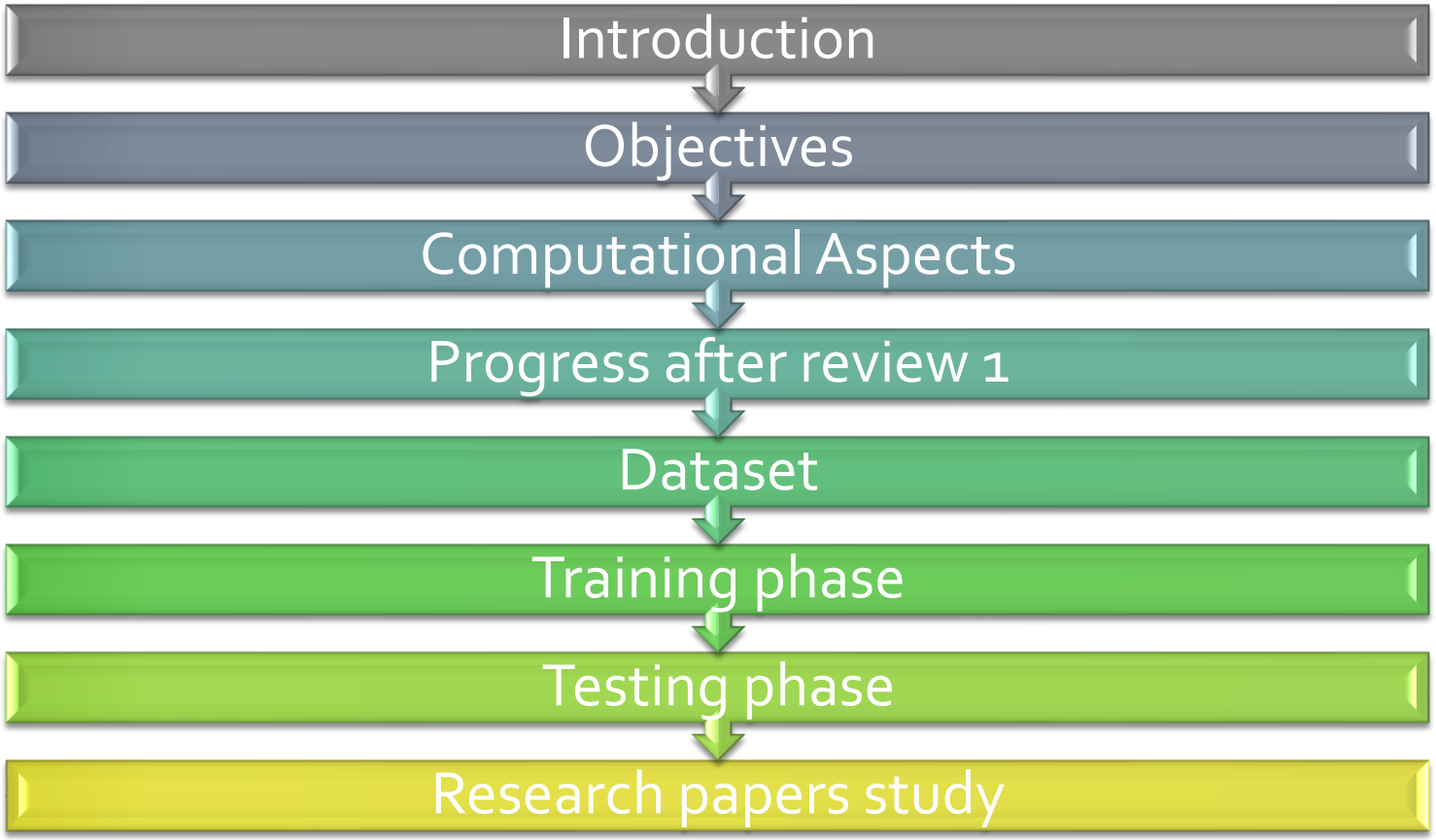
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Introduction

Machine learning helps improve healthcare by predicting drug response and deep learning helps detecting lung cancer from CT scans.

Drug Response Prediction: Uses data to identify the best drug for a patient, reducing side effects and improving treatment.

Lung Cancer Detection: Uses CT scan images and deep learning to detect lung tumors early for faster diagnosis.

Biology Integration: Includes pharmacogenomics, biomarkers, and medical imaging to enhance precision medicine.

OBJECTIVES

Built ML Model: Trained multiple models to predict drug response.

Data Analysis & Visualization: Explored key features and patterns.

Model Comparison & Selection: To identify the best model for drug response.

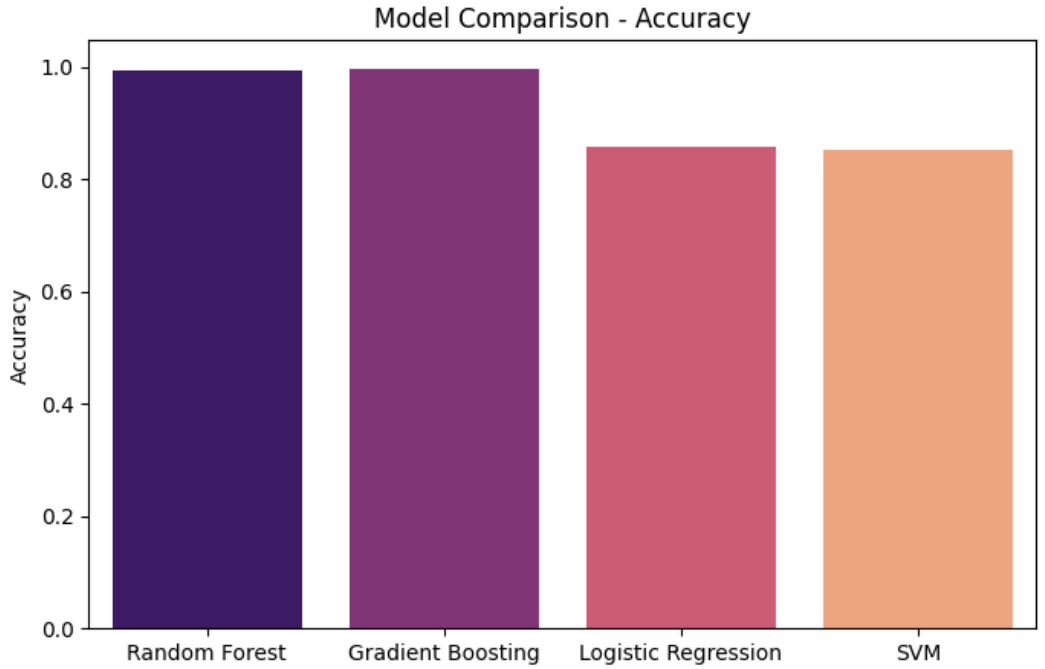
Building a CNN model for lung cancer prediction using CT scans

Computational Aspects

- SVM (Machine Learning):Predicts which drug works best.
- Random Forest:Helps classify patient response to drugs.
- CNN (Deep Learning):Finds lung cancer in CT scans.

Workflow for the model building

- Generated a dataset
- Extract features & target variable
- Split data into training and testing sets
- Trained the models with different algorithms
- Evaluated model performance
- Found best model for drug response and predicted drug response



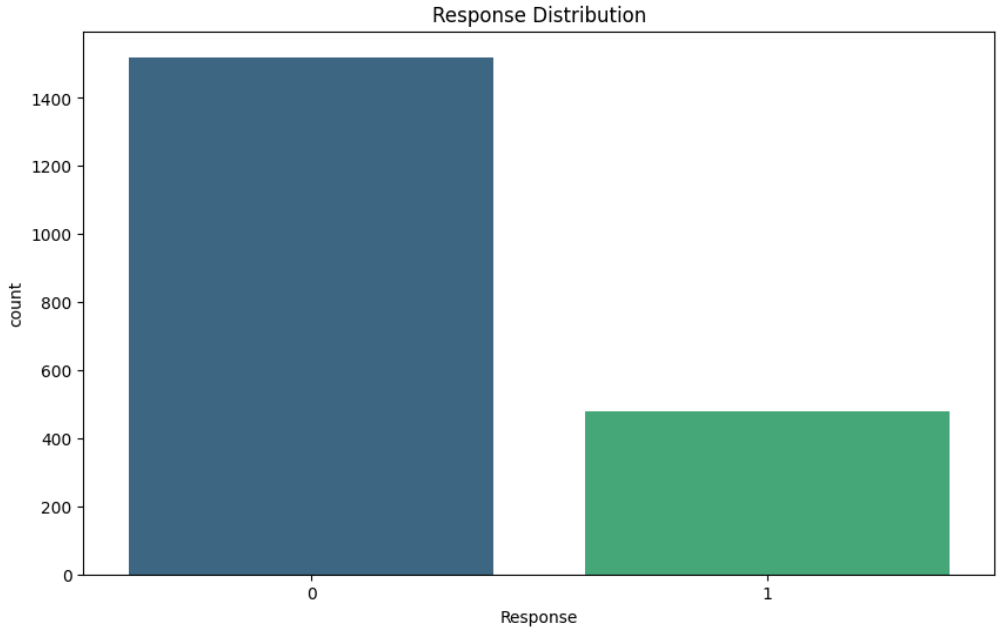
Found that random forest model has high accuracy

```
Random Forest Accuracy: 0.9925
Classification Report for Random Forest:
              precision    recall  f1-score   support

           0       0.99      1.00      1.00       305
           1       1.00      0.97      0.98        95

    accuracy                           0.99       400
   macro avg       1.00      0.98      0.99       400
weighted avg       0.99      0.99      0.99       400
```

- Trained with random forest,svm ,logistic regression,gradient boosting
- Also predicted drug response



About CNN model

Dataset

Bengin case ct scan

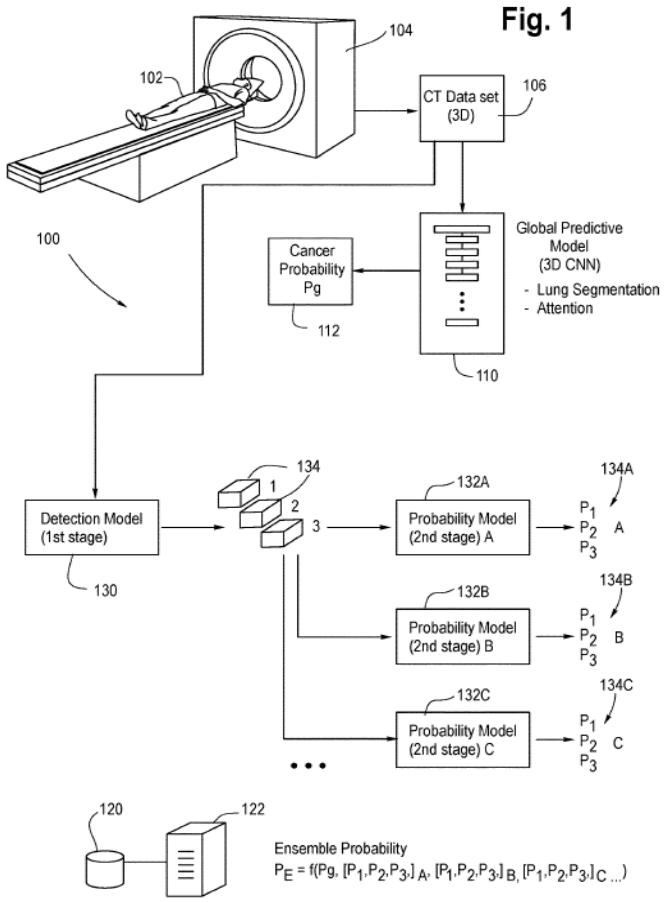
Maligant case ct scan

Normal case ct scan

CASE STUDY :

US000000012032658B2

Jul. 9 ,2024



- Introduces a new way to solve a problem cancer using deep learning.
- Impact: Improves efficiency, cost, safety in medical field.
- Market Potential: High demand with projected growth in the industry.
- Technical Details: Uses deep learning models for better performance, reliability.
- Conclusion: A breakthrough technology with real-world applications.

CASE STUDY :

Jun. 8, 2017

Patent:US201701591.37A1

Innovation: Tests cancer drugs in real-time using live cells & glowing markers.

Faster Results: No need to wait weeks for genetic reports.

Impact:

For Patients: Finds the right drug quickly, fewer side effects.

For Doctors: Saves time, avoids trial-and-error treatments.

Market Potential: Useful for hospitals, pharma companies, and biotech startups.

Conclusion: A breakthrough making cancer treatment faster, accurate, and personalized.

CASE STUDY :

LUNG CANCER PREDICTION USING ML MODELS

- Innovation: Uses an ML model to predict lung cancer based on patient symptom questionnaires.
- Data collection: Adaptive e-questionnaire filled by participants.
- ML model used: SGB model
- Accuracy: Correctly predicts 82% in never smokers, 77% in smokers, 63% in former smokers.
- Conclusion: AI-driven risk assessment can improve early detection and save lives.

CASE STUDY :

Mar. 23 , 2021

US010957041B2

- Innovation: AI scans histopathology images for biomarkers like PD-L1 & TILs.
- Problem: Traditional detection is slow, error-prone, and expertise-dependent.
- Solution: AI automates analysis, predicts biomarkers, and assists treatment decisions.
- Impact: Faster, more accurate diagnosis and personalized immunotherapy.
- Challenges: Data variability, AI validation, and computing costs.
- Conclusion: AI enhances cancer detection & treatment planning for the future.

THANK YOU