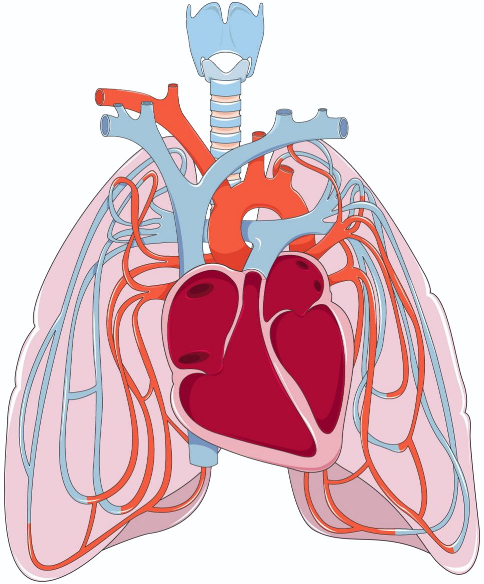

Pneumonia Detection

Inspirit AI 2023

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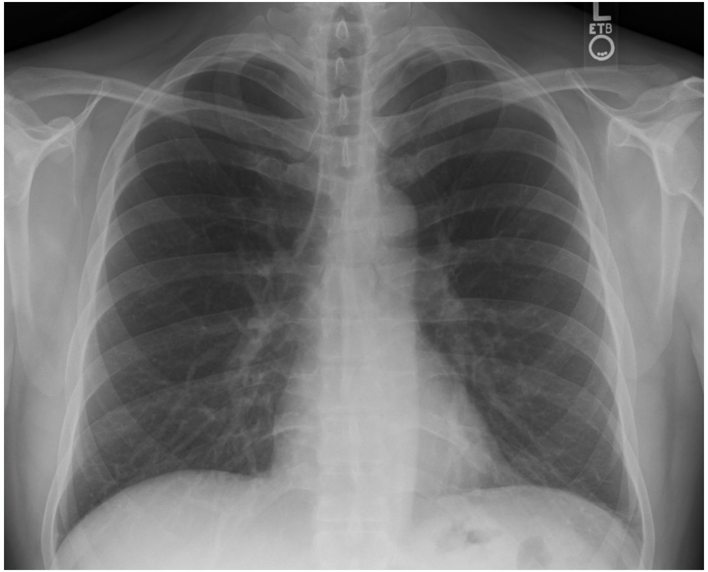
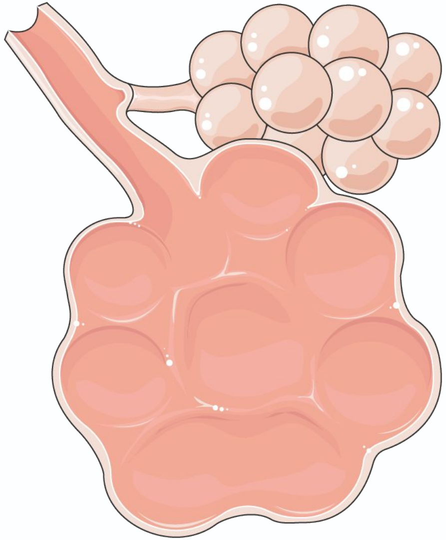
Introduction

What is pneumonia?



Our goal

Our team attempted to code a model which would analyze various chest x-rays to determine whether the patient had Pneumonia or not. In this presentation, the methods and results will be discussed.



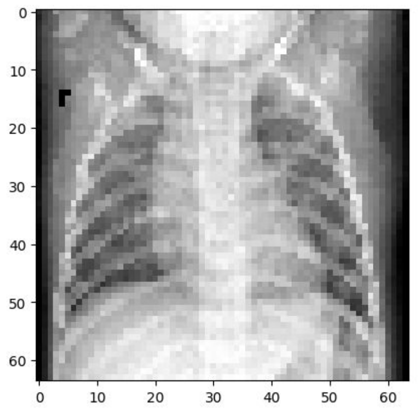
Introduction to Pneumonia

Pneumonia is a respiratory infection that affects the lungs, causing inflammation and infection in the air sacs. It can be caused by bacteria, viruses, fungi, or parasites, leading to symptoms like coughing, chest pain, difficulty breathing, and fever. Pneumonia can impact people of all ages, but certain groups, such as young children, older adults, and those with weakened immune systems, are more susceptible to severe cases. Diagnosis involves physical examination, medical history, and diagnostic tests, while treatment often includes antibiotics, antiviral medications, or antifungal drugs. Preventive measures, including vaccination and good hygiene practices, can help reduce the risk of pneumonia. Seeking timely medical attention is crucial to prevent complications and facilitate recovery.

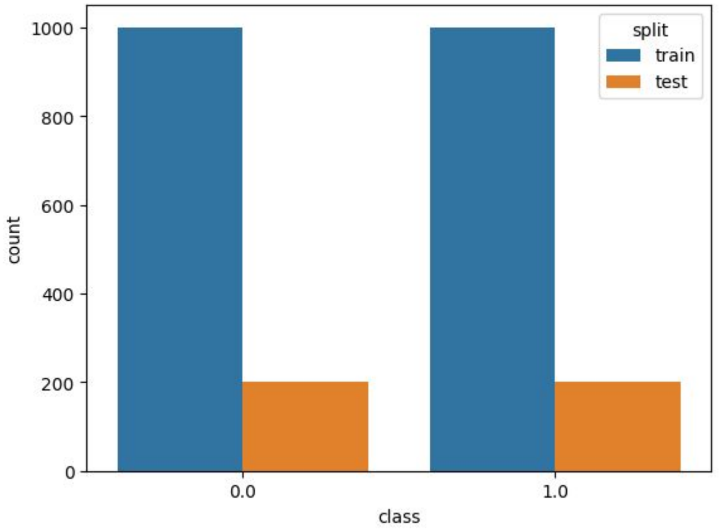
02
Methodology

Dataset

Training image:

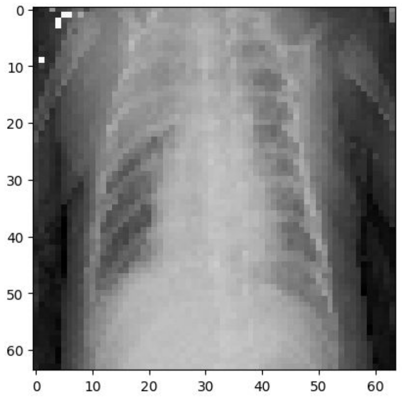


Healthy Lung
(0.0)



(N = 2,400)

Training image:



Pneumonia Lung
(1.0)

KNN

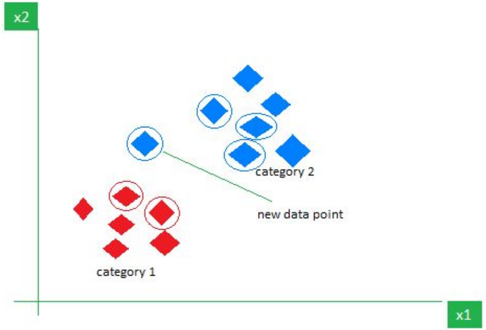
K Nearest Neighbors

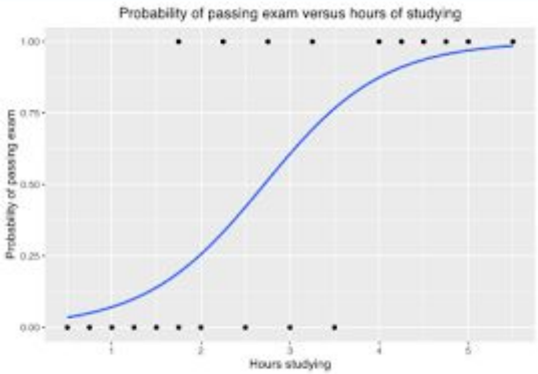
LOG

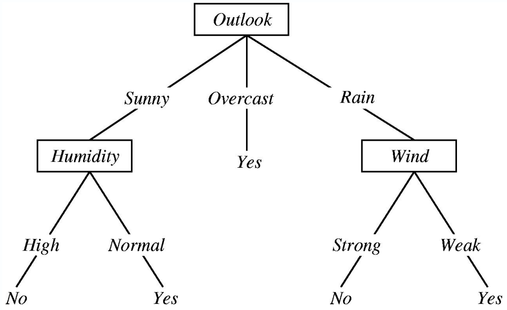
Logistic Regression

DT

Decision Tree

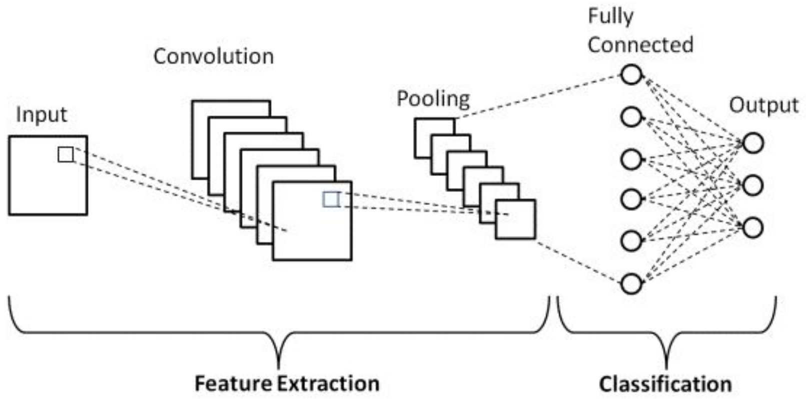






Advanced Models

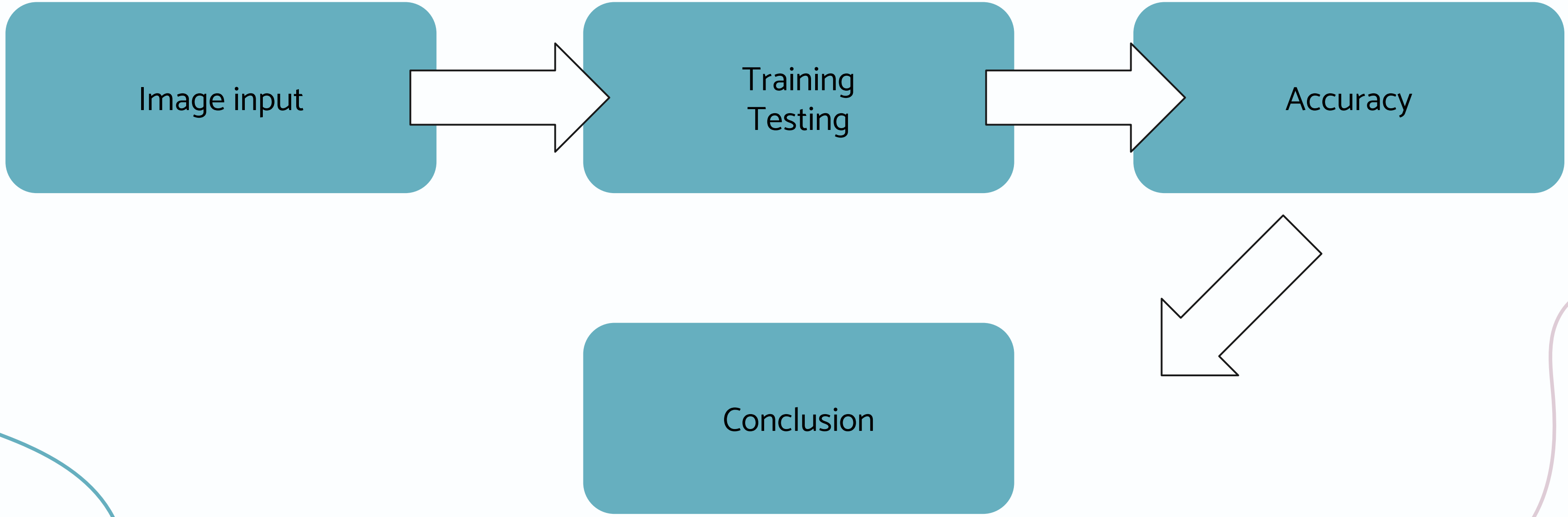
CNN



Transfer Models

- VGG16
- VGG19
- ResNet50
- DenseNet121

How it works

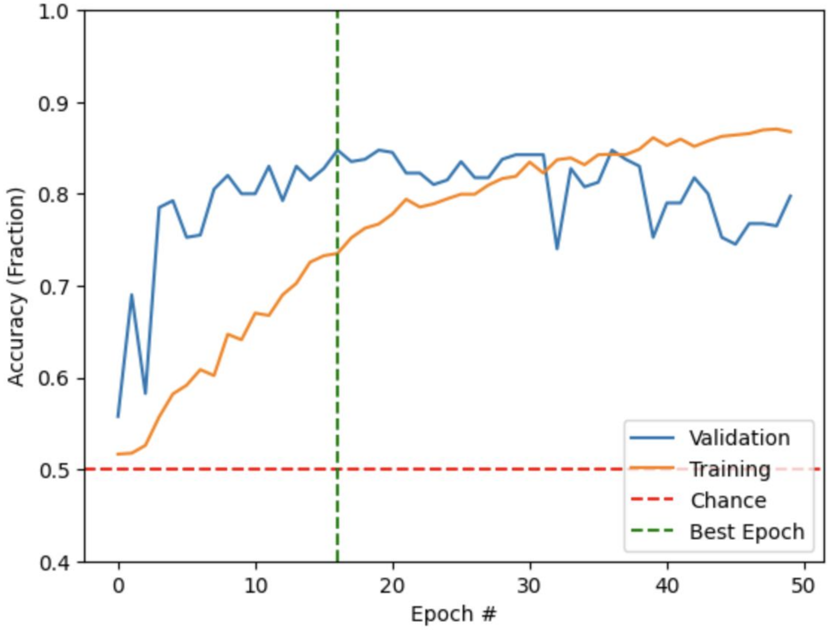


03

Results

Training our model

The model initially achieves a high training accuracy of 0.85. However, the testing accuracy shows instability throughout the 2. At the end, the model's performance on the testing data settles at around 0.75, suggesting potential difficulties in generalizing to unseen data. Further analysis and changes are needed to improve the model's performance on the testing data.

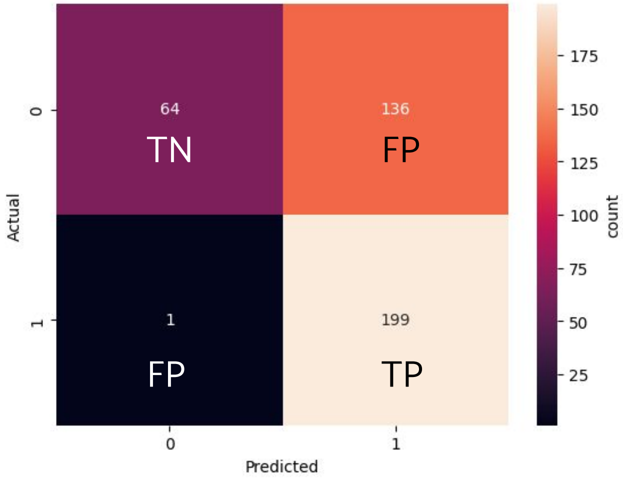


VGG16 Results

Outcome

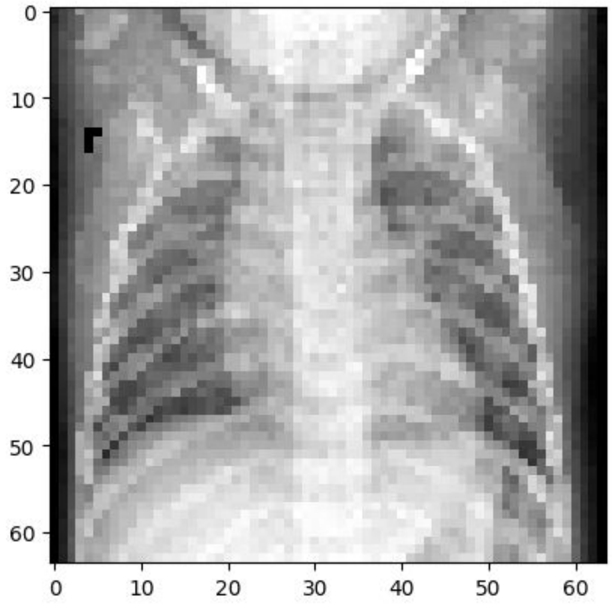
True positive: 199
True negative: 64
False positive: 136
False negative: 1

Confusion Matrix



Results **analysis**

With an accuracy score of 79%, our machine had accurately determined and distinguished between a healthy lung and unhealthy lung 79% of the time.



The Machine had correctly diagnosed pneumonia 199 times with a false negative of only 1. Yet our machine model only correctly diagnosed a healthy lung 64 times out of 200 cases, leaving 136 false positives.

However, the model had a sensitivity of 99.5% having only missed one case of pneumonia. This suggests it could be used effectively to rule OUT pneumonia by screening

Logistic Regression

```
(Logistic regression)

mport numpy as np
rom sklearn.model_selection import train_test_split
rom sklearn.linear_model import LogisticRegression
rom sklearn.metrics import accuracy_score

 Assuming you have a dataset with features X and labels y
 X is a numpy array with shape (num_samples, num_features)
 y is a numpy array with shape (num_samples,)

 Split the dataset into train and test sets
train_data, train_labels) = get_train_data(flatten = True)
test_data, test_labels) = get_test_data(flatten = True)

_train, X_test, y_train, y_test = train_test_split(train_data, train_la

 Create a logistic regression model
odel = LogisticRegression()

 Train the model
odel.fit(X_train, y_train)

 Make predictions on the test set
_pred = model.predict(X_test)

 Evaluate the model's accuracy
ccuracy = accuracy_score(y_test, y_pred)
rint(f"Accuracy: {accuracy}")
```

Our accuracy was 0.965

KNN

```
(KNN)

rom sklearn.neighbors import KNeighborsClassifier
rom sklearn.model_selection import train_test_split
rom sklearn.metrics import accuracy_score

 Assuming you have your image data (X) and corresponding labels (y)
rom sklearn.neural_network import MLPClassifier

train_data, train_labels) = get_train_data(flatten = True)
test_data, test_labels) = get_test_data(flatten = True)

 Split the data into training and testing sets
_train, X_test, y_train, y_test = train_test_split(train_data, train_la

 Create a k-NN classifier object
nn = KNeighborsClassifier(n_neighbors=5)  # Set the number of neighbor

 Train the classifier using the training data
nn.fit(X_train, y_train)

 Make predictions on the testing data
_pred = knn.predict(X_test)

 Evaluate the accuracy of the classifier
ccuracy = accuracy_score(y_test, y_pred)
rint("Accuracy:", accuracy)
```

Our accuracy was 0.943

Neural Networks

```python
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score
from sklearn.model_selection import train_test_split

# Assuming you have your image data (X) and corresponding labels (y)
from sklearn.neural_network import MLPClassifier

(train_data, train_labels) = get_train_data(flatten = True)
(test_data, test_labels) = get_test_data(flatten = True)

# Split the data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(train_data, train_

# Create an MLP classifier object
mlp = MLPClassifier(hidden_layer_sizes=(128, 64), activation='relu', s

# Train the classifier using the training data
mlp.fit(X_train, y_train)

# Make predictions on the testing data
y_pred = mlp.predict(X_test)

# Evaluate the accuracy of the classifier
accuracy = accuracy_score(y_test, y_pred)
print("Accuracy:", accuracy)
```

Our accuracy was 0.955

04

Conclusion

What has been deducted

- The pneumonia detection project aims to revolutionize pneumonia screening through artificial intelligence.
- Machine learning and deep learning algorithms were utilized to accurately detect pneumonia from medical imaging.
- The AI model has undergone training and refinement using a diverse dataset of chest X-rays, resulting in high accuracy in ruling out pneumonia.
- The system has the potential to assist human radiologists in certain scenarios, enhancing screening.
- We've faced challenges like the limited access to diverse datasets and the need to address ethical concerns of integrating artificial intelligence in health care.
- By overcoming certain issues we have the ability to unlock the full potential of AI and improve pneumonia-related patient care.
- Artificial intelligence models offers huge benefits such as accelerated screening and much needed interventions for critical and non-critical cases.
- Using such models in health care can improve patient outcomes, reduce human error and increase accessibility to pneumonia diagnosis all around the world.