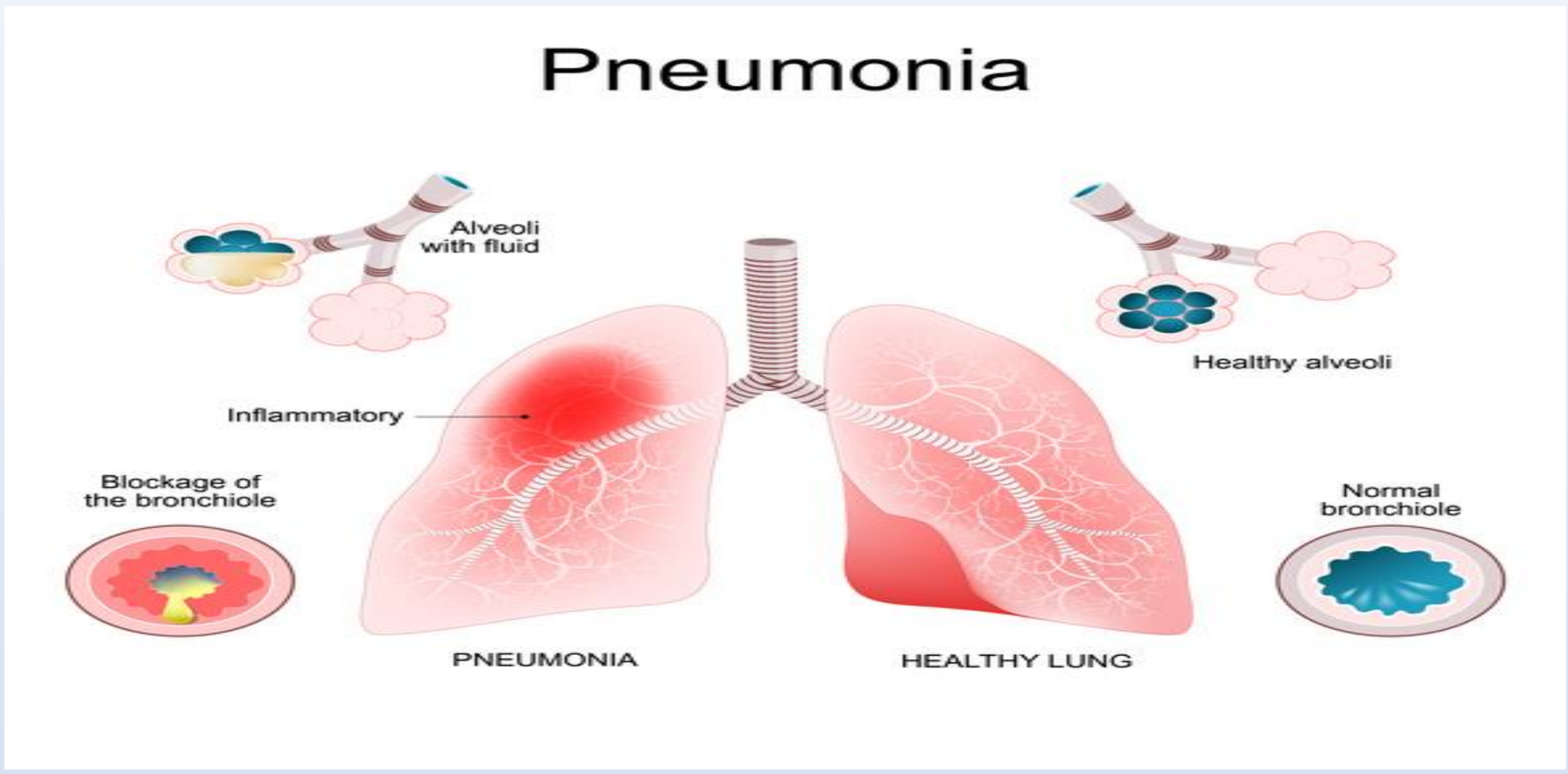
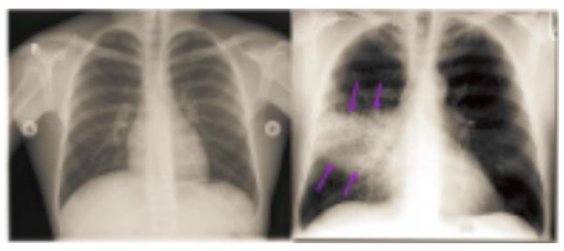
Anomaly Detection on Chest X-Rays with Deep Learning



Introduction

- Pneumonia is a common and death causing disease
- Chest X-Rays are efficient tool for detecting chest diseases
- Analyzing X-ray images is challenging
- The bottleneck is the number of radiologists available



Goal

Identify anomalies in Chest X-ray images, using supervised deep learning methods

Dataset

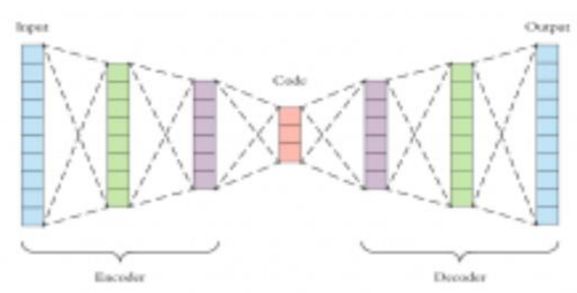
- Chest X-Ray images (Pneumonia)
- The dataset is organized into 3 folders (train, test, val)
- contains subfolders for each image category (Pneumonia/Normal)
- There are 5,863 X-Ray images (JPEG)
- 2 categories (Pneumonia/Normal)

Solution

- We train a network to learn representative features of images of healthy people
- When trying to reconstruct a new image with this network:
- Low distance between output and input => Healthy area
- High distance between output and input =>Anomaly/sick area

Autoencoder

- Learns a function f(x) = x
- Loss function: diff(input,reconstruction)
- Learns data's typical features
- Encodes data by those features and reconstructs it



Network Architecture

- Autoencoder using perceptual loss
- 6 layers in encoder and decoder
- Each layer contains:
  - Batch normalization
  - ReLU