

# Project 3: COVID-19 Lung X-Ray Classification Using Deep Learning

## Introduction

The COVID-19 pandemic, which began in late 2019, was one of the most devastating global health emergencies of the 21st century. Millions of lives were affected-some lost, many others permanently changed. Even though the world has largely returned to normal, occasional reports of new cases in various regions show that the virus is still present and remains a concern.

COVID-19 primarily attacks the lungs and can lead to severe complications such as viral pneumonia. Early detection is key to preventing critical outcomes. With this in mind, I developed a deep learning-powered application that helps identify whether a person has COVID-19 by analyzing their chest X-ray image.

## Project Goal

The goal of this project is to classify chest X-ray images into three categories:

- COVID Positive
- COVID Negative
- Viral Pneumonia

Using deep learning, the system can quickly and accurately predict the patient's condition based on the uploaded lung X-ray image.

## Tools & Technologies Used

- Deep Learning Library: Keras
- Backend: TensorFlow
- Deployment Framework: Streamlit
- Dataset Source: Kaggle
- Image Count: Reduced from 4000 to 1000 images

## Model Architecture

The model is a Convolutional Neural Network (CNN) built using a Sequential API with the following layers:

- Input Layer
- 2 Convolutional Layers
- 2 Pooling Layers
- Flatten Layer
- Dense (Fully Connected) Layer
- Output Layer

Activation Functions:

- ReLU for all hidden layers
- Softmax for the output layer (to classify into 3 categories)

The model achieved around 90% accuracy with solid precision, recall, and F1-score, making it a reliable diagnostic support tool.

## How It Works

- The user uploads a lung X-ray image through the web interface.
- The image is preprocessed and passed through the trained CNN model.
- The app returns one of three predictions:

COVID Negative

COVID Positive

Viral Pneumonia

## Impact

This AI-powered tool can assist healthcare professionals in making faster decisions, especially in

remote or under-resourced areas. While it's not a replacement for clinical testing, it offers a quick, accessible, and cost-effective method for initial screening.