



# COVID-19 X-Ray Diagnosis System

An AI-powered web application for analyzing chest X-ray images to detect COVID-19, Normal, and Viral Pneumonia cases using deep learning.

Python

3.8+

Streamlit

1.28+

TensorFlow

2.0+









## Overview

This application uses a trained deep learning model to classify chest X-ray images into three categories:

- **COVID-19 Positive:** X-rays showing patterns consistent with COVID-19 infection
- **Normal:** Healthy chest X-rays with no signs of infection
- **Viral Pneumonia:** X-rays showing patterns consistent with viral pneumonia



## Features

-  **Accurate Classification:** Deep learning model for X-ray image analysis
-  **Confidence Scores:** Displays prediction confidence percentages
-  **Professional UI:** Clean, medical-themed interface with color-coded results
-  **Detailed Analysis:** Shows probability distribution across all categories
-  **Fast Processing:** Optimized model loading with caching
-  **Responsive Design:** Works on desktop and mobile browsers



## Getting Started

### Prerequisites

- Python 3.8 or higher
- pip package manager

### Installation

1. Clone the repository:

```
git clone <repository-url>
cd Covid_APP
```

2. Install required packages:


```
pip install streamlit tensorflow opencv-python pillow numpy
```

### Running the Application

```
streamlit run app.py
```

The application will open in your default web browser at <http://localhost:8501>

## How to Use

1. **Upload Image:** Click on the file uploader and select a chest X-ray image (JPG, PNG, or JPEG)
2. **Analyze:** Click the "  Analyze X-Ray" button
3. **View Results:** Review the prediction, confidence score, and detailed probability breakdown

## Project Structure

```
Covid_APP/  
├── app.py                # Main Streamlit application  
├── covid_19_model.h5     # Trained deep learning model  
└── README.md            # Project documentation
```

## Model Information

- **Architecture:** Convolutional Neural Network (CNN)
- **Input Size:** 224x224x3 (RGB images)
- **Output Classes:** 3 (COVID-19, Normal, Viral Pneumonia)
- **Framework:** TensorFlow/Keras

## Technical Details

### Image Preprocessing Pipeline

1. Convert PIL Image to NumPy array
2. Resize to 224x224 pixels
3. Convert grayscale images to RGB
4. Normalize pixel values (0-1 range)
5. Reshape for model input

### Dependencies

```
streamlit>=1.28.0  
tensorflow>=2.0.0  
opencv-python>=4.5.0  
pillow>=9.0.0  
numpy>=1.21.0
```

## Important Disclaimer

## This application is for educational and research purposes only.

- This tool should NOT be used as a substitute for professional medical diagnosis
- Always consult with qualified healthcare professionals for medical advice
- The predictions are generated by an AI model and may not be 100% accurate
- Medical decisions should never be based solely on this application's output

## Use Cases

- **Educational:** Learning about AI in healthcare and medical imaging
- **Research:** Exploring deep learning applications in radiology
- **Demonstration:** Showcasing AI-powered diagnostic tools
- **Prototyping:** Building proof-of-concept medical AI systems

## Future Enhancements

- ☐ Add support for DICOM image format
- ☐ Implement batch processing for multiple images
- ☐ Add explainability features (Grad-CAM visualization)
- ☐ Include more detailed medical reports
- ☐ Add user authentication and history tracking
- ☐ Integrate with PACS systems

## Model Performance

The model has been trained on chest X-ray datasets to classify the three categories. For detailed performance metrics and validation results, please refer to the model training documentation.

## Contributing

Contributions are welcome! Please feel free to submit a Pull Request.

## License

This project is licensed for educational and research purposes.

## Authors

- Your Name - Initial work

## Acknowledgments

- Thanks to the medical community for providing labeled X-ray datasets
- TensorFlow and Streamlit teams for excellent frameworks
- Healthcare workers fighting COVID-19 worldwide

## Contact

For questions or feedback, please open an issue in the repository.

Made with  for healthcare and AI research