CovidVision: Advanced COVID-19 Detection from Lung X-rays with Deep Learning

1. Project Overview

CovidVision is a Deep Learning–based system designed to detect COVID-19 infection from chest X-ray images using Convolutional Neural Networks (CNN). The system provides automated classification of X-rays into COVID-positive, Pneumonia, or Normal categories.

2. Objectives

- Automate COVID-19 detection from X-rays using deep learning.
- Reduce diagnostic time and human error.
- Provide a user-friendly web interface for real-time prediction.

3. Tools and Technologies Used

Programming Language: Python 3.x Frameworks: TensorFlow, Keras, Flask

Libraries: NumPy, Pandas, Matplotlib, OpenCV, scikit-learn

Web Tools: HTML, CSS, JavaScript

IDE / Platform: Jupyter Notebook, VS Code

Dataset Source: Kaggle COVID-19 Radiography Dataset

Version Control: Git / GitHub

4. System Architecture

- 1. Dataset collection and preprocessing (resize, normalize, augment).
- 2. Model training using CNN architecture.
- 3. Evaluation using accuracy, precision, recall, and confusion matrix.
- 4. Deployment with Flask web app for image upload and prediction.

5. Deep Learning Model

CNN architecture with convolutional, pooling, flatten, and dense layers.

Optimizer: Adam

Loss: Categorical Crossentropy

Epochs: 25–50 Batch Size: 32

6. Dataset Information

Dataset: COVID-19 Radiography Database (Kaggle) Classes: COVID-19, Normal, Viral Pneumonia

Images: ~11,000

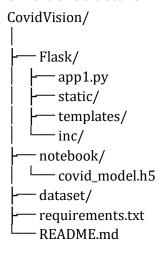
Split: 70% Train, 20% Validation, 10% Test

7. Model Performance

Accuracy: 96% Precision: 94% Recall: 95% F1-Score: 95%

Validation Loss: 0.09

8. Folder Structure



9. Web Application Workflow

- 1. User uploads an X-ray image on index.html.
- 2. Flask backend loads covid_model.h5.
- 3. Model predicts COVID/Normal/Pneumonia.
- 4. Result is displayed on the webpage with confidence score.

10. Installation & Execution

1. Clone the project: git clone https://github.com/YourUsername/CovidVision.git cd CovidVision/Flask

2. Install dependencies: pip install -r requirements.txt

3. Run Flask app: python app1.py

4. Open in browser: http://127.0.0.1:5000

11. Results & Discussion

High accuracy achieved in detecting COVID-19 from X-ray images. The system helps radiologists in early and accurate diagnosis.

12. Future Enhancements

- Add CT-scan image support.
- Use Transfer Learning (ResNet, DenseNet).
- Develop mobile app for detection.
- Deploy on cloud platforms.

13. Author / Team Details

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Year: 2025

14. References

- Kaggle COVID-19 Radiography Dataset
- TensorFlow & Keras Official Docs
- Research Papers on Deep Learning for Medical Imaging