Medical Image Classification using Deep Learning

This project focuses on detecting pneumonia from chest X-ray images using deep learning and machine learning techniques.

🚀 Technologies Used

- **Deep Learning:** ResNet50 (Transfer Learning)
- **Machine Learning:** Random Forest Classifier
- **Libraries:** TensorFlow, Keras, OpenCV, Pandas, NumPy, Matplotlib, Seaborn, Scikit-Learn
- **Evaluation Metrics:** Accuracy, Precision, Recall, F1-Score

📂 Dataset

The dataset consists of labelled chest X-ray images for pneumonia detection.

Paths to the dataset (Replace with your system's path)

TRAIN_DIR = r"/path/to/chest_xray/train"

TEST_DIR = r"/path/to/chest_xray/test"

🛠 Preprocessing & Model Training

- Resized images to 224x224 pixels.
- Normalized pixel values to scale [0, 1].
- Augmented images using ImageDataGenerator.
- Trained a ResNet50 model with GlobalAveragePooling2D for feature extraction.

📊 Model Performance

- Evaluated using confusion matrix, precision, recall, and F1-score.
- Applied RandomForestClassifier for additional classification.

🔥 Results

- Achieved high accuracy in classifying normal vs. pneumonia cases.
- Robust deep learning pipeline for medical image analysis.