# Pneumonia Detection from Chest X-Ray using MobileNetV2

Deep Learning Based Binary Classification

# Problem Definition

- Build an AI model to classify chest X-ray images as NORMAL or PNEUMONIA.
- Use transfer learning with MobileNetV2 to reduce training time and improve generalization.
- Assist radiologists with quick and accurate pneumonia detection.

# Model Architecture

- Base model: MobileNetV2 (pretrained on ImageNet).
- Custom head: GlobalAveragePooling2D + Dropout(0.5) + Dense(sigmoid).
- Input size: 160x160, Batch size: 16, Epochs: 5 (with early stopping).

# Results & Evaluation

- Accuracy on test set: 83%
- Precision (Pneumonia): 91%, Recall: 79%
- Confusion Matrix shows strong pneumonia detection with 310 correct out of 390.
- Model saved using Keras format (.keras).

# Challenges & Lessons Learned

- Validation set had only 16 images — not statistically reliable.
- False negatives (80 pneumonia cases missed) are critical in medical use cases.
- Early stopping helped prevent overfitting.
- MobileNetV2 provided fast, reliable results on CPU.

# Visual Examples (Grad-CAM)