1 Data Acquisition
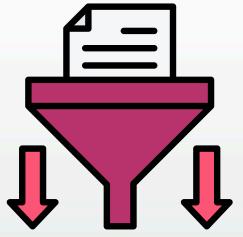
Apnea-ECG Database v1.0.0

- Learning set: 35 records
- Test set: 35 records
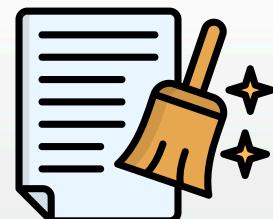
2 Data Preprocessing

- Segmentation
- Noise removal
- Continuous wavelet transform (CWT)
- Scalogram construction

3 Data Segression

To facilitate binary classification-

- Apnea categories
- Non-apnea categories

4 Post-processing

- Feature extraction and distribution analysis
- Dimensionality reduction
- Identifying ambiguous samples
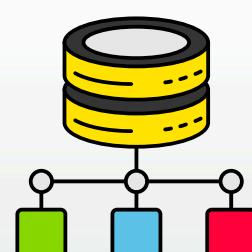- Statistical-metrics based filtering

5 Dataset Splitting

- Training set: 80%
- Validation set: 10%
- Test set: 10%
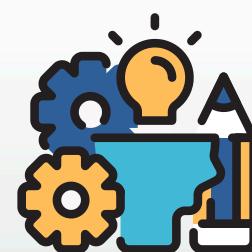
6 Classifier Training

- Proposed model
- VGG16
- ResNet50
- MobileNet
- Xception
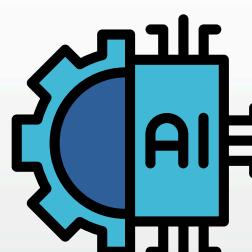- Densenet121
- GRU
- LSTM
- Bi-LSTM

7 Grad-CAM Integration

- An explainable artificial intelligence technique
- Integrated with proposed model

8 Model Evaluation

- Based on performance metrics
- Comparative analysis
- Hyperparameter Tuning
- Model explainability