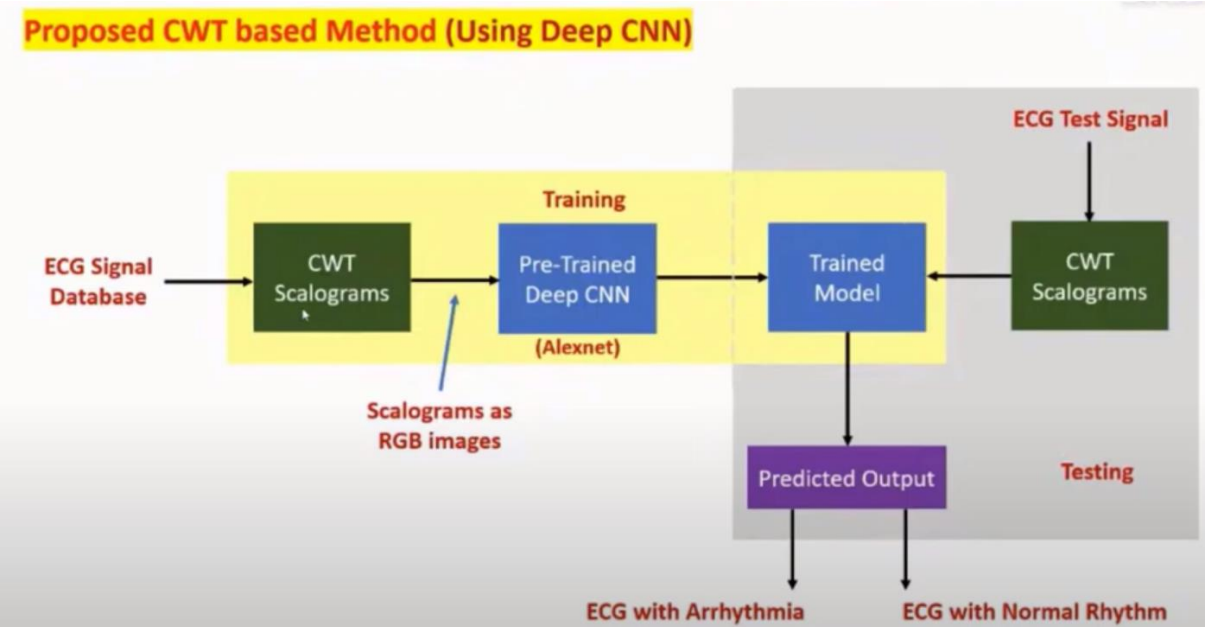
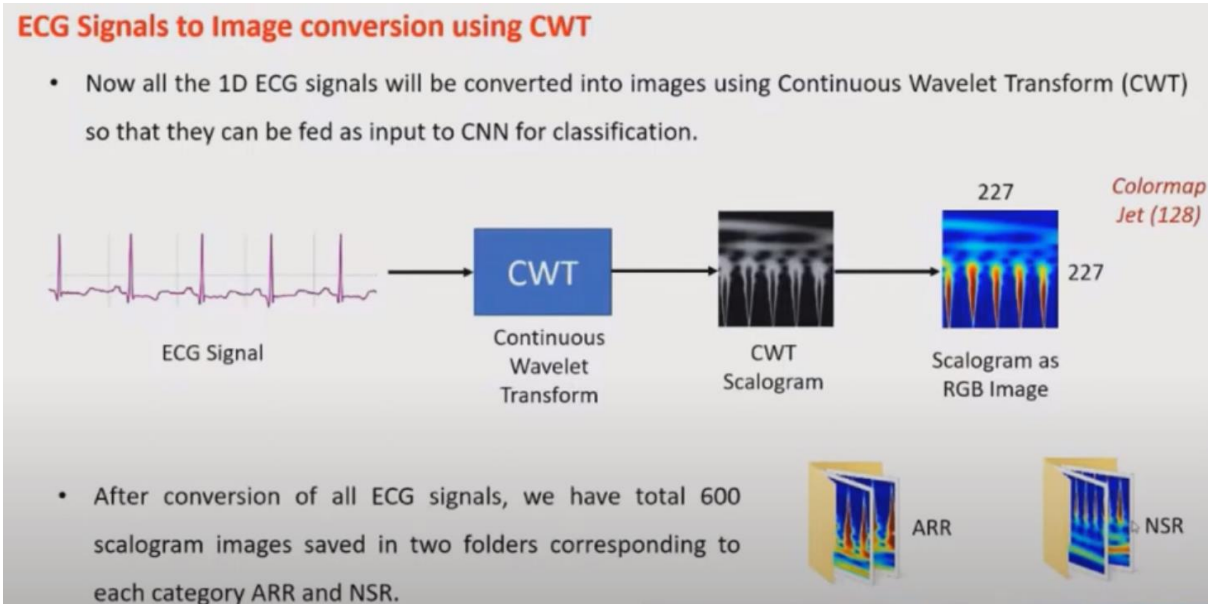
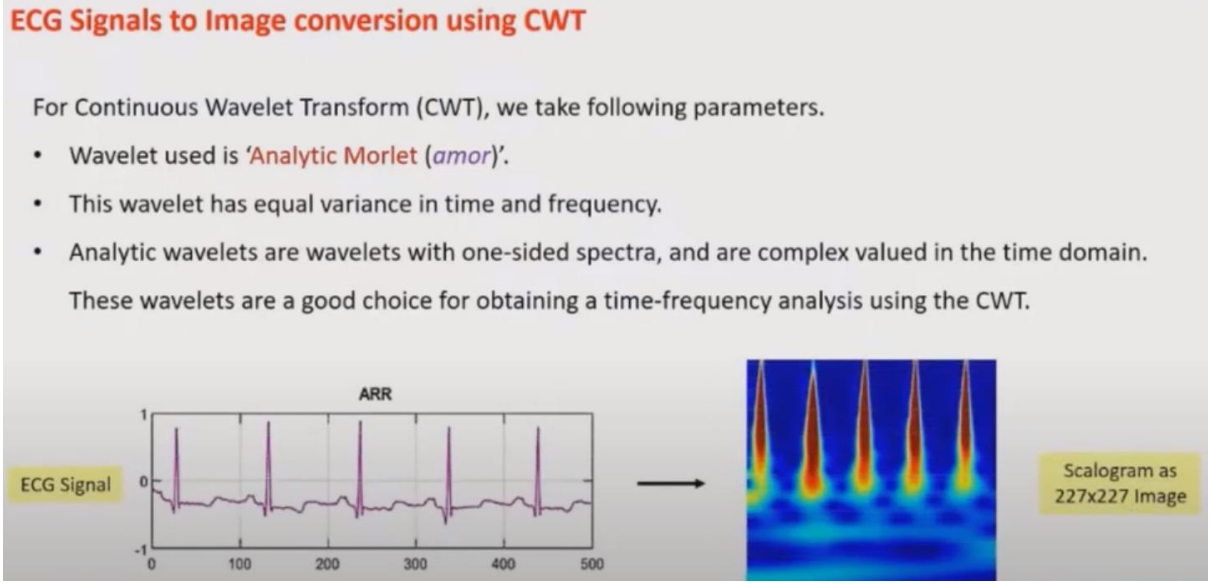
Report on ECG Signal Classification using Continuous Wavelet Transform and Deep Neural Network (CNN)

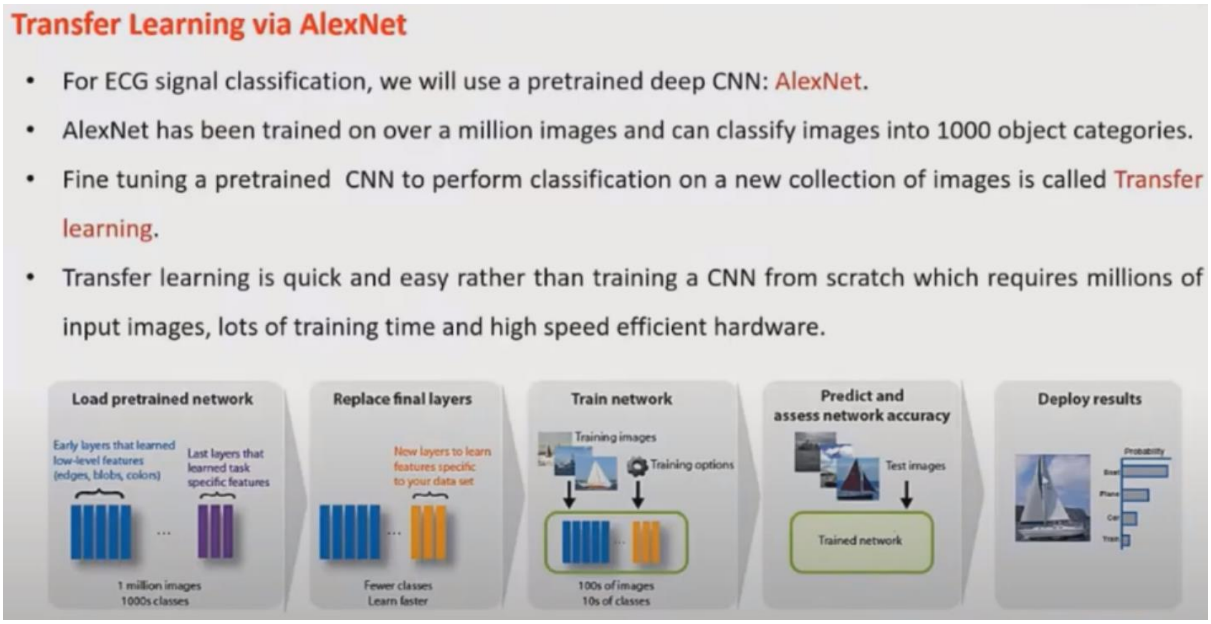
Methodology:



Procedure:







ECG Signals Database

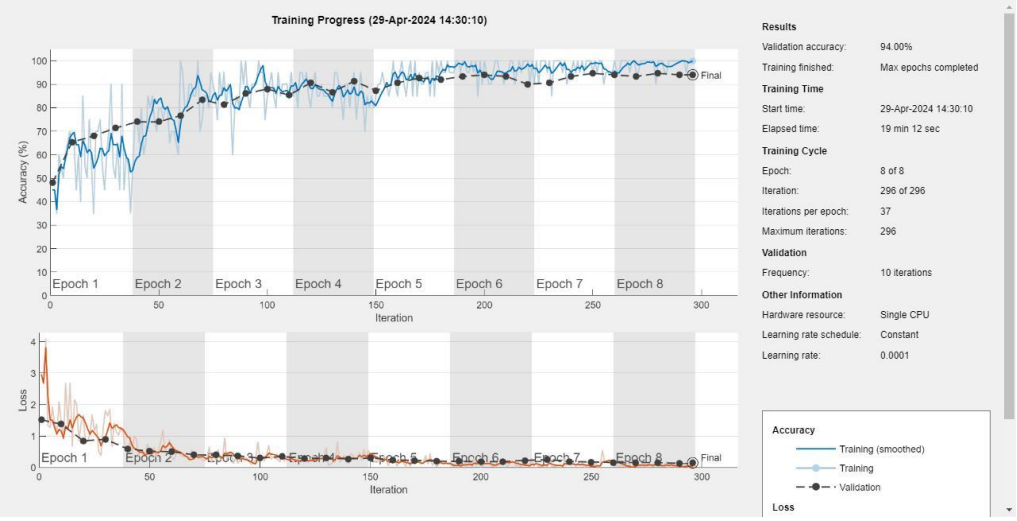
We use ECG signals of three categories:

- Cardiac Arrhythmia (ARR)
- Congestive Heart Failure (CHF) and
- Normal Sinus Rhythms (NSR).

These signals are obtained from 162 ECG recordings from three PhysioNet databases:

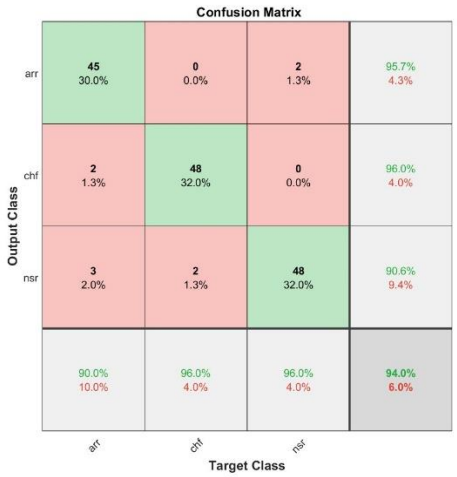
- MIT-BIH Arrhythmia Database (96 Recordings) [ARR Signals]
- MIT-BIH Normal Sinus Rhythm Database (30 Recordings) [NSR Signals]
- BIDMC Congestive Heart Failure Database (36 Recordings) [CHF Signals].

Results:



Validation Accuracy: 94.00%

Confusion Matrix:



Conclusions:

- ECG signals are important to diagnose various heart diseases. Besides manual inspection, computer-aided inspection can also play an important role in almost accurate diagnosis.
- Computer-aided diagnosis saves time, money, and the requirement of expertise availability.
- This machine interpretation can be accommodated in portable hardware devices also that can help people in early diagnosis and medication.
- Wavelets have established their significance in ECG feature extraction and helped deep neural networks to predict accurate results up to 99% accuracy.
- Symlet4 wavelet has proved to be a better choice for ECG signal analysis in DWT, and Analytic Morlet is found better in CWT of ECG signals.