**Classification of Arrhythmia by Using Deep Learning with 2-D ECG Spectral Image Representation:**

Arrhythmias are a group of cardiac disorders characterized by irregular heart rhythms, posing significant health risks to patients. Traditionally, ECG signals have been analysed in the time or frequency domains. However, these approaches have limitations in capturing subtle patterns and variations in arrhythmias. In this study, we propose a method to convert ECG signals into 2-D spectral images, allowing for a more comprehensive representation of cardiac rhythms. These spectral images are generated by applying Short-Time Fourier Transform (STFT) to ECG data, resulting in a visual representation that preserves both time and frequency information.

The combination of deep learning and 2-D ECG spectral image representation opens up new possibilities for enhancing the accuracy and efficiency of arrhythmia detection and management in clinical practice. Our experimental results demonstrate the effectiveness of this approach, with high accuracy, sensitivity, and specificity in arrhythmia classification. This research offers a promising avenue for improving arrhythmia diagnosis and monitoring, potentially leading to more precise and timely medical interventions. Furthermore, the model’s interpretability is enhanced by visualizing the learned features in the spectral domain, providing valuable insights into the characteristics of various arrhythmias.

**Technology Stack:**

* Python
* Anaconda
* Jupyter