Project Design Phase-II
Technology Stack (Architecture & Stack)

Date	03 October 2022
Team ID	PNT2022TMID19938
Project Name	Classification of Arrhythmia by Using Deep Learning with 2-D ECG Spectral Image Representation
Maximum Marks	

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

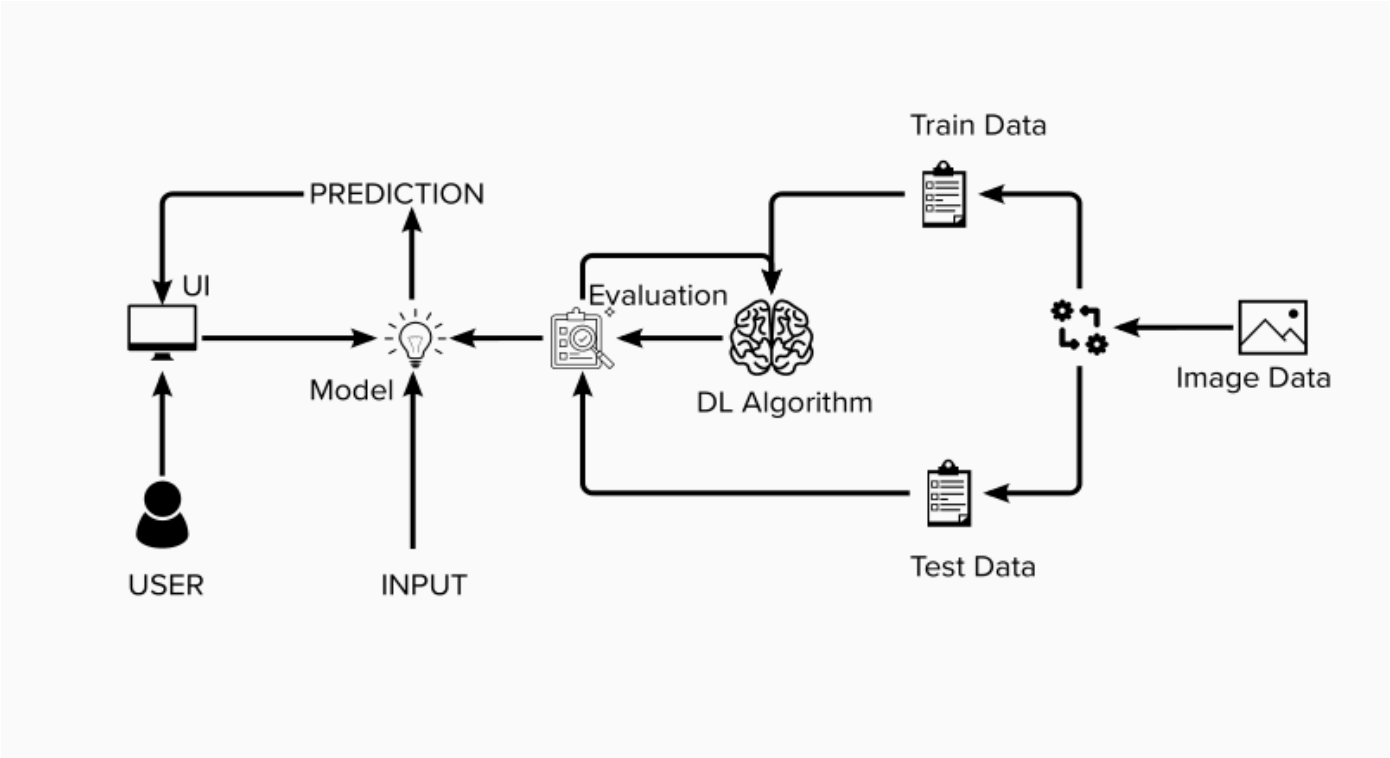

Table-1 : Components & Technologies

S.No	Component	Description	Technology
1.	User Interface	How user interacts with application e.g. Mobile App, Chatbot etc.	HTML, CSS, JavaScript / Angular Js / React Js etc.
2.	Application Logic-1	Convolution neural networks	Tensor flow
3.	Application Logic-2	Data augmentation	Keras, pytorch
4.	Database	MIT-BIH arrhythmia database	MySQL
5.	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local Filesystem
6.	Machine Learning Model	Supervised Learning define a set of target classes (objects to identify in images), and train a model to recognize them using labeled example photos.	Image Recognition Model

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Google Tensorflow, an open-source software framework for building and using machine learning neural networks, is very easy to set up and extend. It's the most popular deep learning framework, with the largest number of GitHub stars and the second-highest percentage of open source repositories.	Tensorflow framework,pytorch
2.	Availability	We have used a pre-trained convolutional neural network (CNN), namely AlexNet, to train using 5,655 single-lead ECG recordings. Initially, we have extracted a spectrogram for all 30s signals and converted them to RGB images with Continuous Wavelet Transform (CWT); later fed to transferred AlexNet and trained with some changes in specifications. The findings of the study indicate that our technique attains a state-of-the-art accuracy of 97.9% and an F1 score of 98.82% while having higher overall sensitivity (98.9%) and specificity (90.7%) and outperformed all existing methods.	ImageNet, AlexNet
3.	Performance	The proposed CNN-based classification algorithm, using 2-D images, can classify eight kinds of arrhythmia, namely, NOR, VFW, PVC, VEB, RBB, LBB, PAB, and APC, and it achieved 97.91% average sensitivity, 99.61% specificity, 99.11% average accuracy, and 98.59% positive predictive value (precision).	Tensorflow(CNN)