

## [FA-0036]

## A Decentralized Federated Learning Framework for Cardiovascular Disease Prediction

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**Objective:** Federated learning (FL) preserves data privacy and allows the collaborators to generate an efficient global model for a given problem. Therefore, the FL gets popular in the medical for diagnosis, monitoring, and therapeutic applications. We have proposed the decentralized FL framework to prevent one-point failure and predict cardiovascular disease based on diversified features.

**Methods:** Wearable and Implantable medical devices (WIMD) are widely used in healthcare for monitoring, diagnosis, and treatment. The WIMD data are sensitive in nature and include personally identifiable information (PII), which requires an anonymization technique to prevent PII sharing. Therefore, the traditional machine learning and deep learning approach are not recommended due to privacy concerns. We have proposed a decentralized FL approach that allows multiple data holders to collaborate and build a common predictive model for cardiovascular disease, without explicit data exchange to preserve the data privacy and prevent one-point failure.

**Results:** In order to evaluate our proposed decentralized FL framework, we have utilized the publicly available UCI heart disease dataset, which consists of 303 instances with heart disease status. For experimental purposes, we have considered five data holders that collaborate and build a common predictive model after 5 number of rounds. The federated support vector machine (SVM) with stochastic gradient descent (SGD) was used for training the local model. While the federated averaging algorithm was used for generating the global model that takes the average of all the local model updates. Based on this experimental setup for cardiovascular disease prediction, we have achieved an average accuracy of 52.2% for local models and 90.12% for the global model.

**Conclusion:** In this study, we have proposed a decentralized FL framework for cardiovascular disease prediction that produces an aggregated efficient model by averaging the updates from the local models. The purpose of considering the decentralized FL was to ensure the data privacy and generation of an accurate model that can be utilized by all the collaborators for predicting cardiac disease. The result shows an improved accuracy as compared to the traditional machine learning and centralized FL approaches.

Dataset Information: https://archive.ics.uci.edu/ml/datasets/heart+disease

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