An Evaluation of Federated Learning In Training COVID-19 Patient Risk Prediction Using Deep Learning Models

Yushen Chen[1], Zifan Zhu[2], and Min Zhang[3]

[1]yche2692@uwo.ca, 251101857
[2]mzhan782@uwo.ca, 251356705
[3]zzhu459@uwo.ca, 251346954

November 8, 2023

Abstract

The COVID-19 pandemic has created significant challenges for our healthcare system over the past five three years, one of the challenge that brings a lots of concerns is protect patient data privacy while training effective Deep Learning (DL) models related COVID-19. Federated Learning (FL) is a technique that the training data can be locally kept at the data source without uploading to a central server while training the DL model in a distributed manner. In this setting, the data source will train the DL model using its own local dataset and only uploads the model updates to the server. With this nature, we will evaluate the feasibility of integrating FL with popular DL models, such as Convolutional Neural Network (CNN), RESNET-18, Recurrent Neural Network (RNN), and Generative Adversarial Networks (GANs),to train DL models related COVID-19 patient risk prediction. In this work, models will be trained using the dataset provided by the Mexican government (Link), which contains an enormous number of anonymized COVID-19 patient information. Finally, We will compare our result with traditional centralized training approaches in terms of training costs, such as additional computation burdens on data source,

and model accuracy to identify possible trade-offs lies between data-privacy preservation and training performance.