



# Federated Learning platform for medical institutions

Project Advisor: Dr. Magdalini Eirinaki

Team Members: Poojitha Vaddey  
Arselan Alvi  
Vatsa Patel  
Yuan Wan

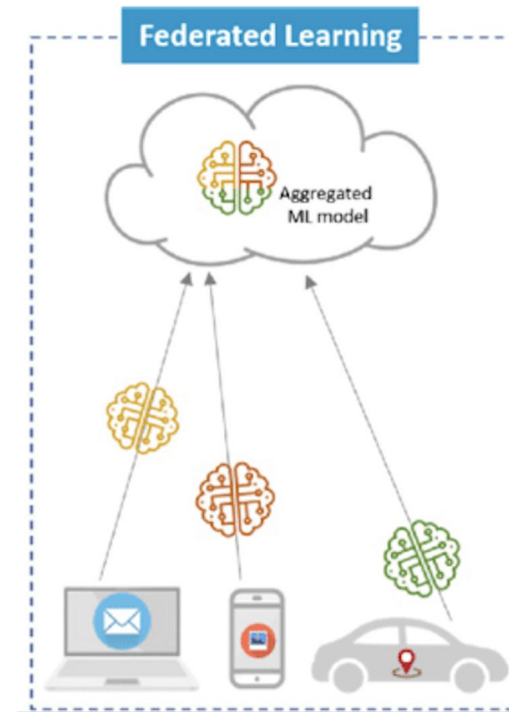
# About



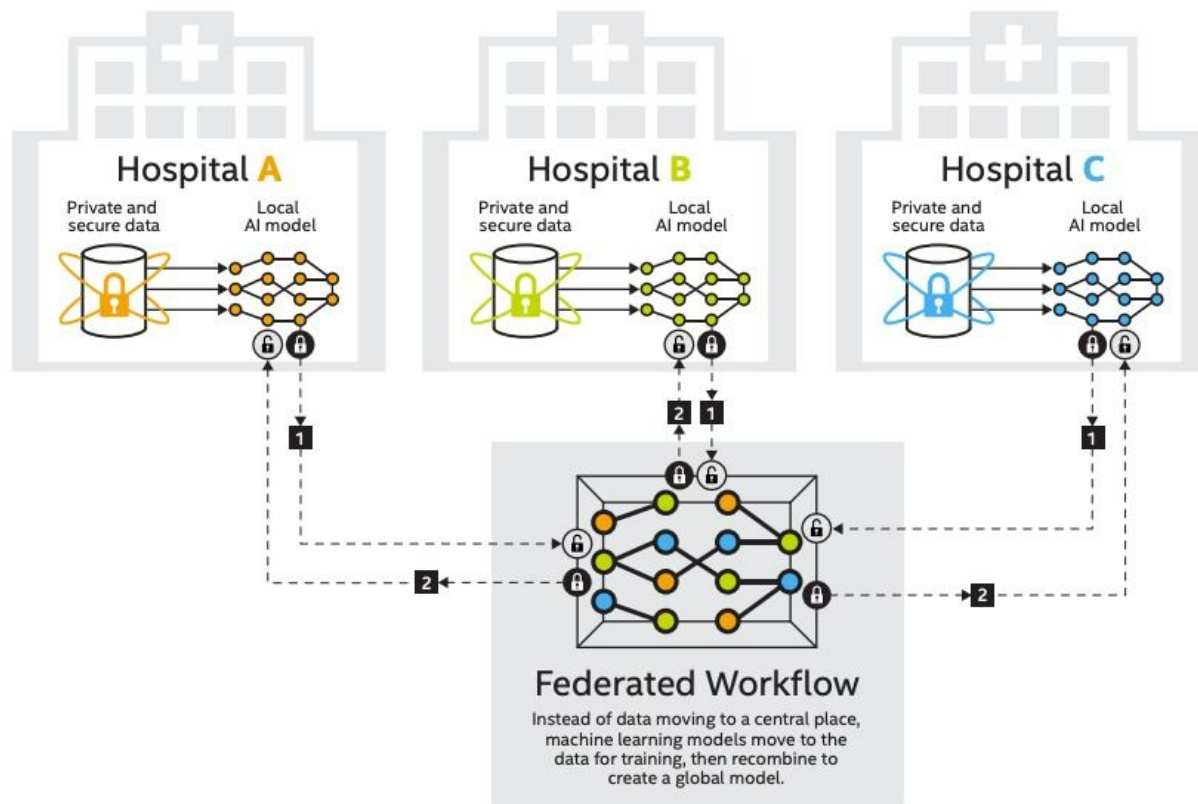
- A Software tool with Federated Learning using healthcare datasets.
- Why Federated Learning?
  - Data Sharing is important in healthcare industry yet many organizations find it risky to share their data.
    - Privacy issues.
  - With Federated Learning algorithms we can perform efficient predictions without actually looking at the data and hence maintaining the privacy.
- Train various healthcare datasets with Federated algorithm and create a SAAS framework for the healthcare industry.

# ML / Federated Learning overview

- Datasets
  - COVID-19 Datasets
  - Other Healthcare datasets
  - Healthcare.gov
- Perform Data Mining for multiple health datasets to feed the data to the federated Learning model.
- Federated Model
  - Perform remote data training unlike Centralized approach
  - Data sharing
    - Privacy is vital for healthcare industries.



# Implementation plan and System Architecture

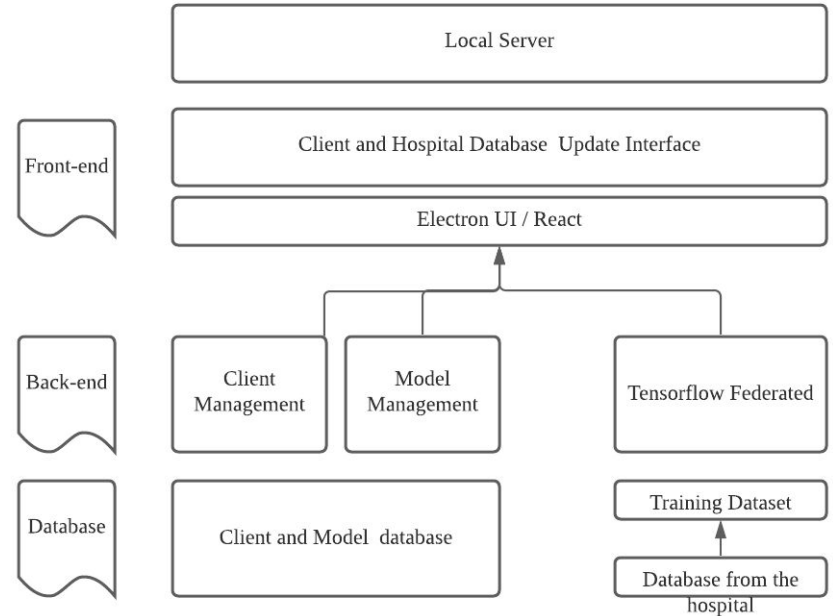
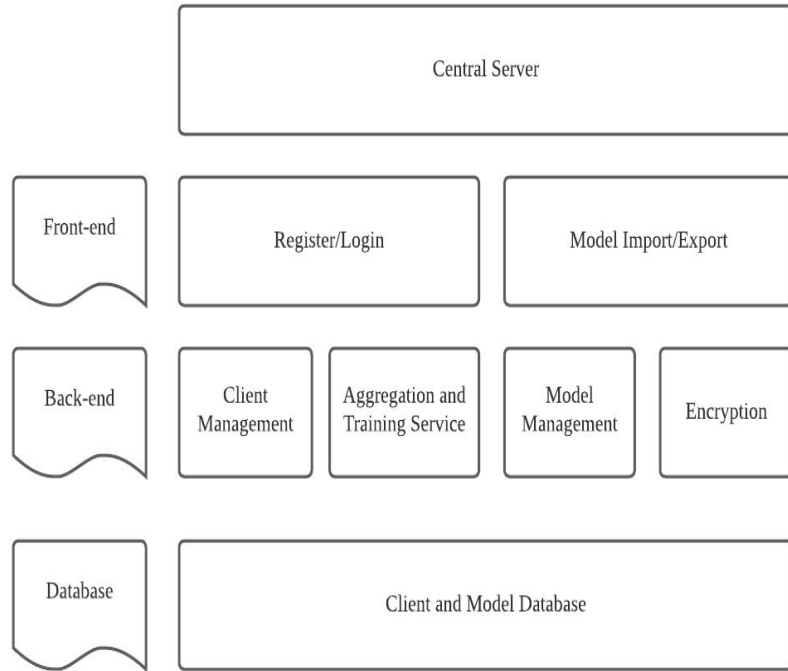




# Federated Learning Accomplishments

- Performed an experiment similar to the following baseline:
  - “Communication-Efficient Learning of Deep Networks from Decentralized Data”, experiments were performed from the MNIST CNN and SHAKESPEARE LSTM with the Federated averaging algorithm to calculate Fed avg accuracy. The paper describes the analysis on the results.
- Implemented Federated averaging algorithm with the MNIST Test-dataset that holds images of handwritten numbers.
- With **Federated Averaging algorithm** :
  - From 1st to 10th iteration: Accuracy boosted from 82% to 94%.
- **Datasets:**
  - Multiple COVID-19 datasets (healthcare.gov) to mine the data and train the model to perform predictions by utilizing the Federated Learning Approach.

# Server-side and Front end Architectures





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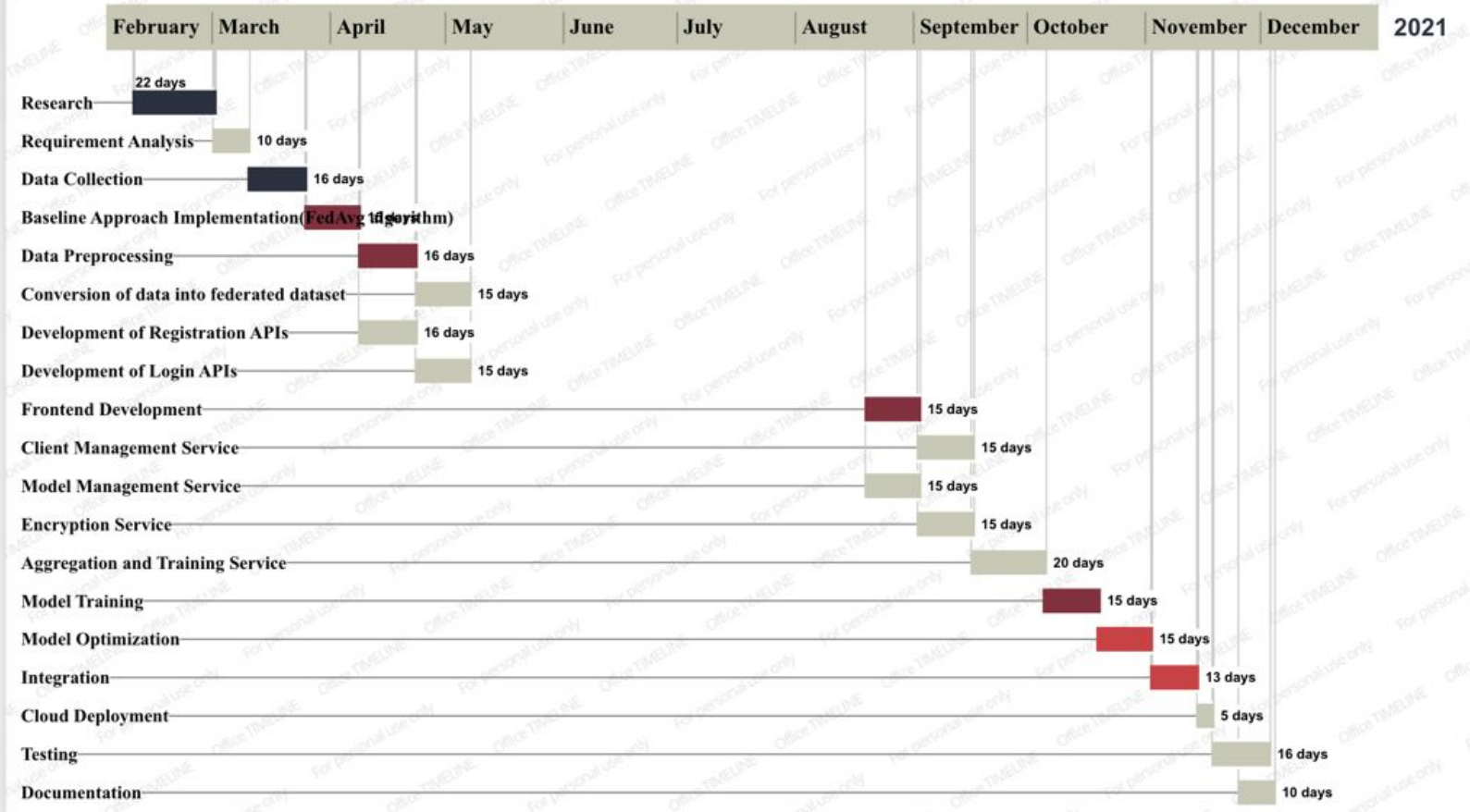
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Files	Predictions
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<a href="#">healthcare1.csv</a>	<a href="#">View Predictions</a>
<a href="#">test2set.csv</a>	<a href="#">View Predictions</a>

# Project Timeline







## Future Work ( CMPE 295B)

- Development of Client-side application and federated learning framework
- Preprocessing of the medicare dataset and converting it into federated dataset
- Training the federated model with the pre-processed dataset for multiple epochs
- Evaluation of the model using the metrics and optimization to achieve better accuracy
- Integration of the federated model with the SaaS framework
- Deployment of the federated system to the cloud
- Work on the implementation details in the project report