NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

School of Computer Science and Engineering
College of Engineering

Federated Learning Study

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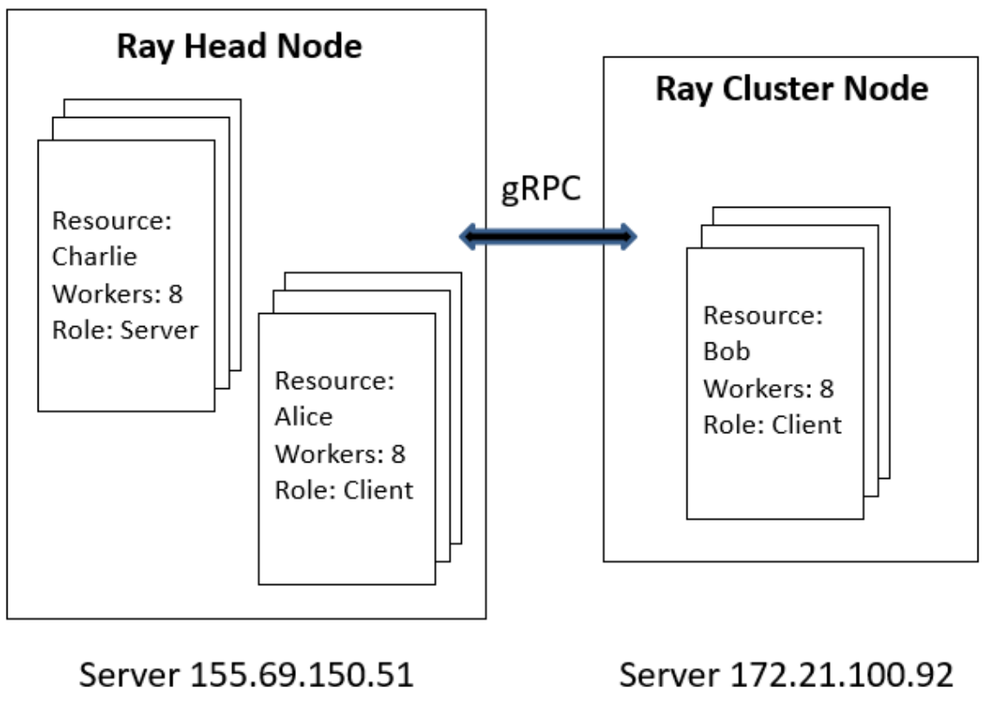
Project Objectives:

With the inception of the Metaverse, Mobile Augmented Reality (MAR) devices need to perform image classification to overlay digital information onto the real world. However due to limited data per device, and privacy limitations in centralized data collection, federated learning will be required to train models jointly. Therefore, it is important to benchmark the performance of federated learning systems on classification tasks and continue to improve it further. Thus, the objective of this study is to explore and analyze Horizontal Federated Learning on classification tasks relevant for MAR, primarily image classification, using neural networks and a centralized communication architecture.

FL Setup with 2 Linux Machines



Frameworks

Flower

PyTorch

SECRETFLOW

Datasets

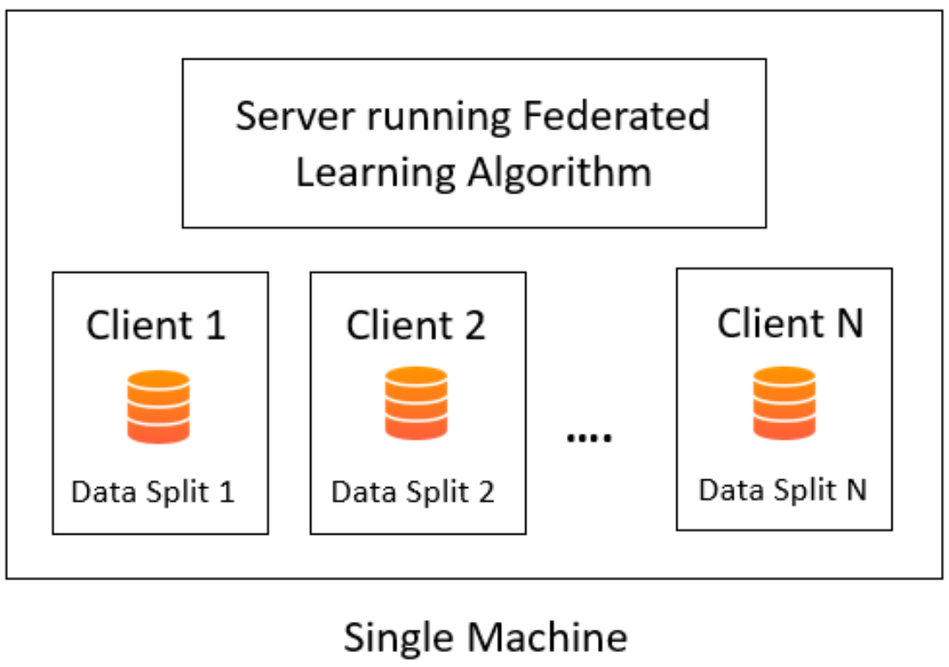
MNIST

FashionMNIST

Cifar10

Criteo

FL Setup with Client Simulation using Data Splitting



Key Experiments

Comparison of FL System Performance in IID vs Non-IID Client Data Distribution Settings

Comparison of FL System Performance for different Input Image Resolutions

Comparison of FL System Performance with different FL algorithms: FedAvg, FedAvgM, FedProx and FedOpt