

Federated Edge Learning Testbed

I Introduction

Federated edge learning: distributes the AI-model training task over edge devices by using their data locally to preserve the privacy under the WiFi network.

II: Hardware Components

The platform consists of an edge server (ES), six edge devices (Eds), and a wireless router, which is shown as in Fig. 1.

One ES: AGX Xavier in the middle. Six EDs: other two AGX Xavier's and four Xavier NX's. Wireless access point: AC3100.



Fig. 1. Hardware components.

III Experiment results

MNIST is selected as the training data set. Consider two schemes with **i.i.d.** and **non-i.i.d.** data sets. For the **i.i.d.** case, in the MNIST training data set, each ED randomly selects a number of samples without putting back, and takes the extracted samples as its local data set. For the **non-i.i.d.** case, the MNIST training data set is divided into ten sub-data sets according to the number label (0-9), each contains all the training samples of the corresponding number label.

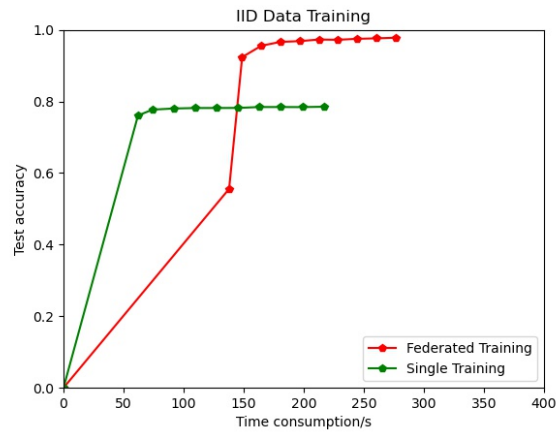


Fig. 2. Test accuracy v.s. Time consumption for i.i.d. data set.

Fig. 2 shows that federated learning can effectively use the local data of multiple client data sets to train data models with higher accuracy.

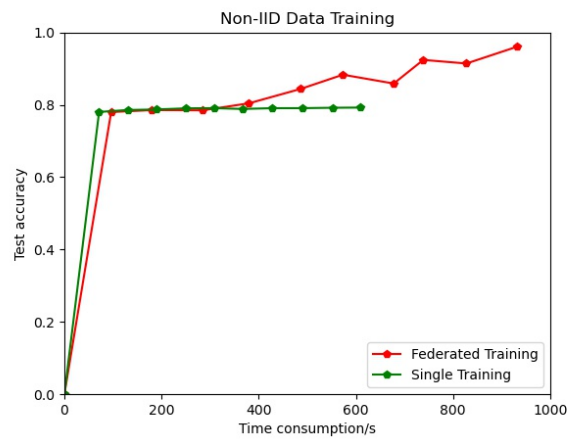


Fig. 3. Test accuracy v.s. Time consumption for non-i.i.d. data set.

Fig. 3 shows that federated learning with joint training obtains better performance without really using other sub-data sets.