Work Progress

***Abstract*—**
***Index Terms*—Non-iid, Split-Fed,**

I. Realated research

There has been a lot of research on non-IID data in federated learning, but the main focus has been on how to make the model perform better under non-IID data [1]. Since protecting user privacy is a top priority in federation learning, the main task in federation learning is to modify the training logic to make the model more tolerant of non-IID data. But until now, there has been no effective solution for federated learning with non-IID data, and it has been assumed that non-IID data will make training results worse.

II. My purpose

In federated learning, the user's data cannot be shared at all, and since the server has access to the user's label and training tensor in split-fed, the server can guess the distribution of the user's data.

I considered two scenarios to improve the accuracy of the training. First, after the server has obtained the intermediate results of all users' training, making all the data mix into the IID state (even if it cannot be turned into IID data, reducing the non-IID ratio to below 0.5 is also satisfactory).

Second, I was inspired by last week's post on speeding up model training, which is that the model training process does not necessarily use its own real gradients [2]. We can let the user's data train on the first local layer, then immediately transfer the intermediate results to the server. The server will mix all the intermediate results into IID state, and then return to the user, users use the processed IID data to complete the following training.

III. My confusion

My first idea in the previous section is very similar to our proposed Minibatch-SFL, but I think they are fundamentally different. In Minibatch-SFL, the server is still training non-iid data within each mini-batch, which may cause the server model to shift.

In addition, the choice of split-fed version is very important, and I prefer to choose papers that we have studied and emulated. Because this model is relatively stable and has been published. I wonder if the teacher has any good suggestions.

References

[1] C. Thapa, P. C. M. Arachchige, S. Camtepe, and L. Sun, "Splitfed: When federated learning meets split learning," in *Proceedings of the AAAI Conference on Artificial Intelligence*, vol. 36, pp. 8485–8493, 2022.

[2] D.-J. Han, H. I. Bhatti, J. Lee, and J. Moon, "Accelerating federated learning with split learning on locally generated losses," in *ICML 2021 workshop on federated learning for user privacy and data confidentiality. ICML Board*, 2021.