FEDERATED LEARNING: A COMPARISON OF METHODS

HOW DO DIFFERENT FL FRAMEWORKS COMPARE?

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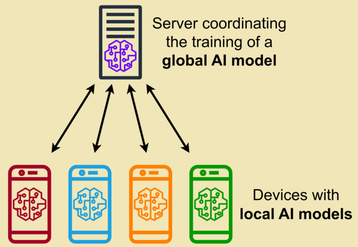
INTRODUCTION

Federated Learning is a machine learning paradigm that allows decentralized learning to occur on different machines or clients. In this approach, each client has its own local dataset and trains its own model, which is then aggregated by a central server in each learning round.



METHODOLOGY

General Heuristics

- Ease of setup
- Documentation
- Examples
- Framework tools

Performance

- Training accuracy

OBJECTIVE

Compare NvidiaFlare, OpenFL, Flower in terms of general heuristcs and performance.

RESULTS

The results will help researchers or developers decide which platform to choose when developing a Federated Learning algorithm.

Related literature

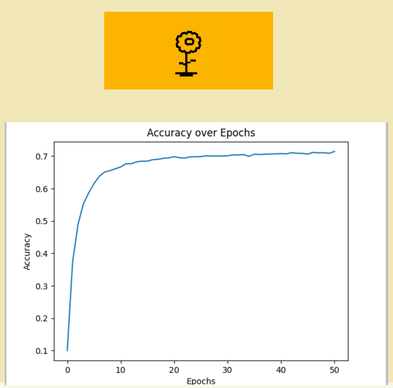
- NVIDIA. "NVIDIA Flare." Developer Resources. Available at: https://developer.nvidia.com/flare.
- Secure and Federated AI. (n.d.). openFl. GitHub Repository. Retrieved from https://github.com/securefederatedai/openfl
- Flower. (n.d.). Flower: A Friendly Federated Learning Research Framework. Retrieved from https://flower.dev/
- McMahan, H. B., Moore, E., Ramage, D., Hampson, S., & y Arcas, B. A. (2017). Communication-efficient learning of deep networks from decentralized data. In Proceedings of the 20th International Conference on Artificial Intelligence and Statistics (AISTATS) (Vol. 54, pp. 1273-1282).

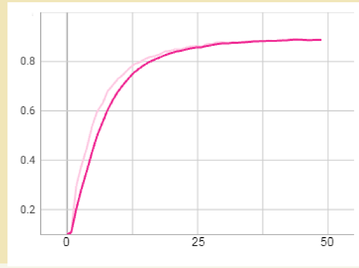
ANALYSIS

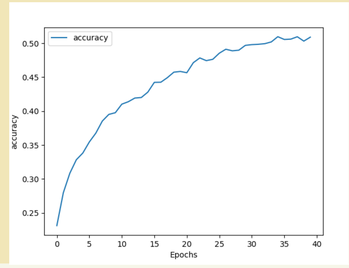
For each framework the same setup was used in order to compare the performance of the same model and aggregation algorithm.

This way, the analysis will focus on how the infrastructure of each framework performs on the same task.

EXPERIMENTS







CONCLUSION

Upon completing the comprehensive comparison utilizing the established methodology, the decision-making process regarding the selection of a framework becomes easier.

This empowers developers and researchers to embark on the rapid implementation of Federated Learning algorithms, thus expediting progress in this domain.