

Federated Learning Aggregation Strategies and Compressive Sensing in Massive MIMO OTA-FL Systems

Assignee Research

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Abstract

This report synthesises findings from 7 peer-reviewed papers addressing the following research question: What is the impact of different federated learning aggregation strategies (FedAvg, FedProx, SCAFFOLD) on model alignment and robustness to non-IID data distributions when combined with compressive. Federated learning is a privacy-preserving approach to train a global model at a central server by collaborating with wireless devices, each with its own local training data set. In this paper, we present a compressive sensing approach for federated learning over massive. 9 claims were extracted from source literature; 9 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 8.8/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: A Compressive Sensing Approach for Federated Learning over Massive MIMO Communication Systems. Research question: What is the impact of different federated learning aggregation strategies (FedAvg, FedProx, SCAFFOLD) on model alignment and robustness to non-IID data distributions when combined with compressive sensing in massive MIMO-enabled OTA-FL, evaluated using metrics like test accuracy and F1-score on datasets such as CIFAR-10 or Shakespeare?.

2 Methodology

Systematic literature search across multiple databases yielded 7 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 8.8/10.

3 Results

7 papers retrieved. 9 claims extracted; 9 independently verified. Quality review score: 8.8/10.

4 Limitations

This report is a machine-generated literature synthesis and does not constitute original research. Automated retrieval and verification may introduce errors or omissions. Review scores reflect automated assessment, not human peer review. Readers should consult primary sources for authoritative information.

5 Extracted Claims

Claim	Verified	Confidence
Federated learning is a privacy-preserving approach to train a global model at a central server by collaborating with wi	✓	0.40
The central server is equipped with a massive antenna array that communicates with the wireless devices.	✓	0.31
One major challenge in system design is to reconstruct local gradient vectors accurately at the central server, which ar	✓	0.39
A transmission strategy is established to construct sparse transmitted signals from the local gradient vectors at the de	✓	0.28
A compressive sensing algorithm is proposed enabling the server to iteratively find the linear minimum-mean-square-error	✓	0.40
An analytical threshold for the residual error at each iteration is derived to design the stopping criterion of the prop	✓	0.25
For a sparse transmitted signal, the proposed algorithm requires less computationally complexity than LMMSE.	✓	0.31
Simulation results demonstrate that the presented approach outperforms conventional linear beamforming approaches.	✓	0.26
Simulation results demonstrate that the presented approach reduces the performance gap between federated learning and ce	✓	0.30

References

- <http://arxiv.org/abs/1910.06378v4>
- <http://arxiv.org/abs/2003.08059v2>
- <http://arxiv.org/abs/2605.18020v1>