

Non-IID Data Distribution Impacts on Federated Language Model Convergence and Accuracy

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Abstract

This report synthesises findings from 13 peer-reviewed papers addressing the following research question: How does non-IID data distribution affect the convergence rate and final accuracy of federated language models on code generation benchmarks. The proliferation of edge devices has brought Federated Learning (FL) to the forefront as a promising paradigm for decentralized and collaborative model training while preserving the privacy of clients' data. However, FL struggles with a significant performance reduction and. 6 claims were extracted from source literature; 0 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 2.8/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Stable Diffusion-based Data Augmentation for Federated Learning with Non-IID Data. Research question: How does non-IID data distribution affect the convergence rate and final accuracy of federated language models on code generation benchmarks?.

2 Methodology

Systematic literature search across multiple databases yielded 13 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 2.8/10.

3 Results

13 papers retrieved. 6 claims extracted; 0 independently verified. Quality review score: 2.8/10.

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
Gen-FedSD significantly enhances accuracy by at least 12% and 6% on CIFAR-10 and CIFAR-100 datasets, respectively, under	×	0.04
Under extreme data heterogeneity, Gen-FedSD exhibits accuracy improvements of at least 20% and 7% for the CIFAR-10 and C	×	0.04
Gen-FedSD reduces the memory footprint from 567.44 MB to 22.69 MB for the Vanilla FedAvg method under Dir (0.5) setting.	×	0.03
Gen-FedSD reduces the memory footprint from 1588.84 MB to 22.69 MB for the Vanilla FedProx method under Dir (0.5) settin	×	0.03
Gen-FedSD reduces the memory footprint from 907.91 MB to 22.69 MB for the Vanilla FedNova method under Dir (0.5) setting	×	0.03
Gen-FedSD reduces the memory footprint from 794.42 MB to 22.69 MB for the Vanilla Scaffold method under Dir (0.5) settin	×	0.03

References

- <http://arxiv.org/abs/2303.12869v1>
- <http://arxiv.org/abs/1910.03581v1>
- <http://arxiv.org/abs/2405.07925v1>