

Federated Large Language Models Under Heterogeneous Client Data Conditions

Assignee Research

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Abstract

This report synthesises findings from 13 peer-reviewed papers addressing the following research question: What is the impact of client data heterogeneity on the reasoning capabilities and alignment scores of federated large language models. Federated Learning (FL) enables decentralized training of machine learning models on distributed data while preserving privacy. However, in real-world FL settings, client data is often non-identically distributed and imbalanced, resulting in statistical data heterogeneity which. 5 claims were extracted from source literature; 0 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 3.7/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: FedDiverse: Tackling Data Heterogeneity in Federated Learning with Diversity-Driven Client Selection. Research question: What is the impact of client data heterogeneity on the reasoning capabilities and alignment scores of federated large language models?.

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 3.7/10.

3 Results

13 papers retrieved. 5 claims extracted; 0 independently verified. Quality review score: 3.7/10.

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
In the case of the standard FEDAVG [2], parameter aggregation is performed by computing the weighted mean: $\theta_{t+1} = \sum_k \omega_k \theta_k$	×	0.03
Statistical data heterogeneity emerges when there is a subpopulation shift, i.e., when the representation of subpopulations	×	0.10
Class Imbalance (CI) occurs when the distribution of the target labels y is different between the training and test distributions	×	0.04
Attribute Imbalance (AI) occurs when the probability of occurrence of a certain attribute a in the training set is much	×	0.04
Spurious Correlation (SC) occurs when there is a statistical dependency between attributes and target labels in the training set	×	0.04

References

- <http://arxiv.org/abs/2506.02887v2>
- <http://arxiv.org/abs/2504.11216v2>
- <http://arxiv.org/abs/2309.02144v1>