FSANL: Symmetric Active Negative Loss for Robust Federated Learning Under Heterogeneous Label Noise

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***Abstract*—Federated learning (FL) enables collaborative model training across decentralized clients while preserving data privacy. However, real-world FL deployments often face two major challenges: data heterogeneity and label noise. The former arises due to non-IID client distributions, while the latter results from user-generated annotations, sensor failures, or distribution shifts, conditions that severely degrade the performance of standard FL algorithms. Existing approaches typically rely on multi-stage training, client selection strategies, or assume the presence of clean clients, which may not hold in realistic settings. In this work, we propose Federated Symmetric Active Negative Loss (FSANL), a simple yet effective single-stage framework designed to improve robustness under heterogeneous label noise without assuming any clean clients. FSANL integrates normalized and symmetric cross-entropy losses with an active negative suppression term, along with global L1 regularization to counteract client drift. Extensive experiments on CIFAR-10 demonstrate that FSANL outperforms existing baselines, including FedCorr and FedProx, under various non-IID and noisy label scenarios.**

***Keyword*—Federated learning, noisy label learning, non-IID, robust loss**

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