AI Sovereignty Just Got a Library

Decentralized training without averaging — a new foundation for self-hosted AI

Swipe for insights →

THE DATA

substantially less communication

Communication Overhead

LEAN reduces data transfer burden in federated fine-tuning by replacing model averaging with a library-based adaptation system.

In asynchronous, heterogeneous environments — the norm for independent AI labs — traditional averaging fails due to data skew and unstable convergence. LEAN bypasses aggregation entirely, instead using a shared library of rank-1 basis pairs that participants check out, fine-tune locally, and return. This eliminates the need for synchronized updates and reduces bandwidth demands, making distributed training viable for resource-constrained teams.



Source: arXiv · Published November 23, 2026
https://arxiv.org/abs/2611.26805

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No Averaging. No Bottleneck.

The core innovation of LEAN is the elimination of model averaging — a long-standing bottleneck in federated learning. By treating adapter parameters as modular components in a shared library, participants avoid the instability caused by mismatched data distributions. This allows independent researchers and small teams to contribute to a collective model without requiring centralized coordination or synchronized updates, enabling true autonomy in training.



02

Shuffling Beats Syncing

LEAN leverages random shuffling of basis pairs across devices to cancel out data heterogeneity at first order. Unlike traditional methods that assume data homogeneity or require full synchronization, LEAN's shuffle mechanism ensures that each basis pair is exposed to diverse data across sites. This enables robust convergence even under heavy asynchrony and data skew — a critical advantage for sovereign AI stacks operating in real-world, non-uniform conditions.

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