

Incentives in Federated Learning with Heterogeneous Agents

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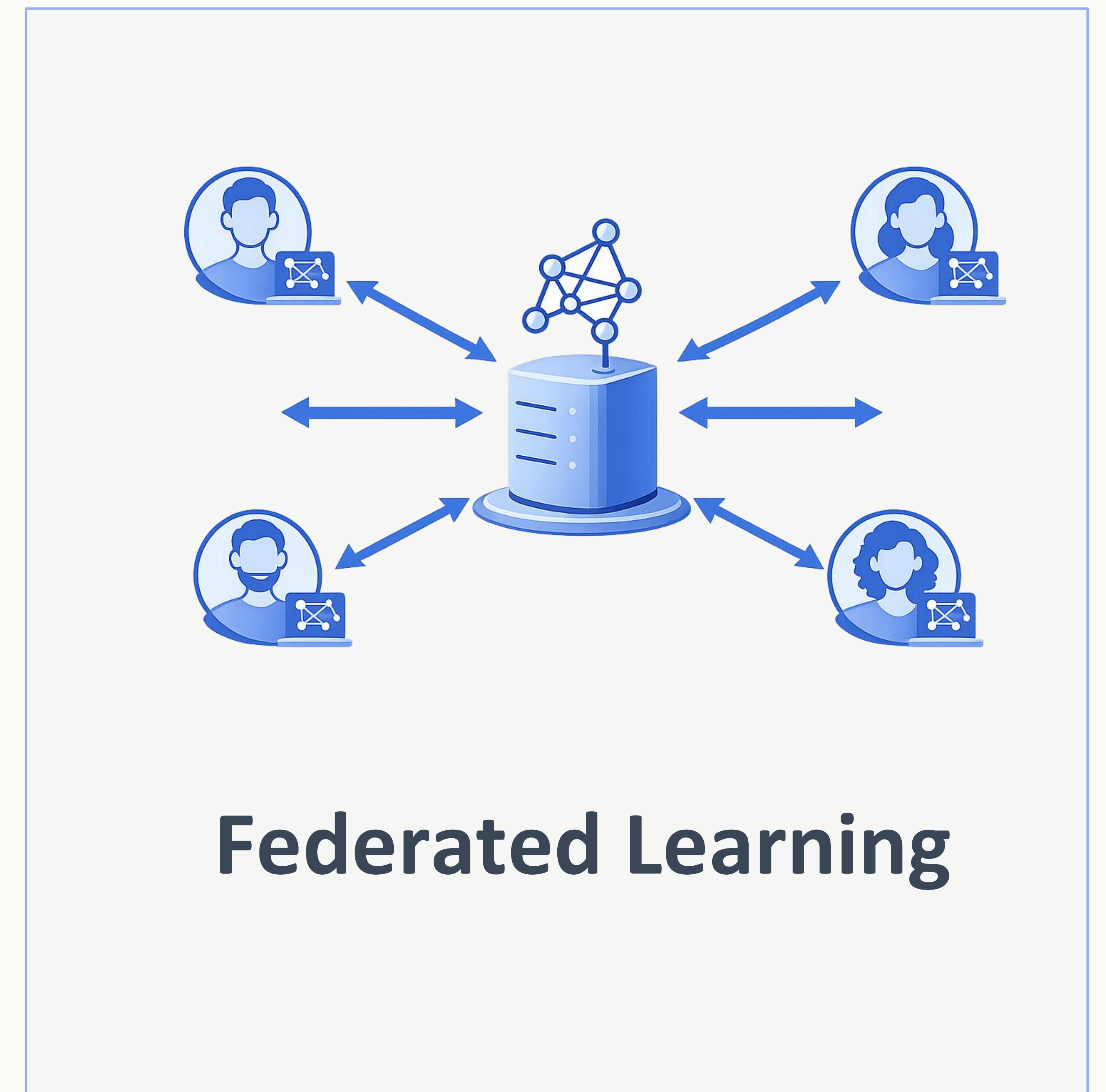
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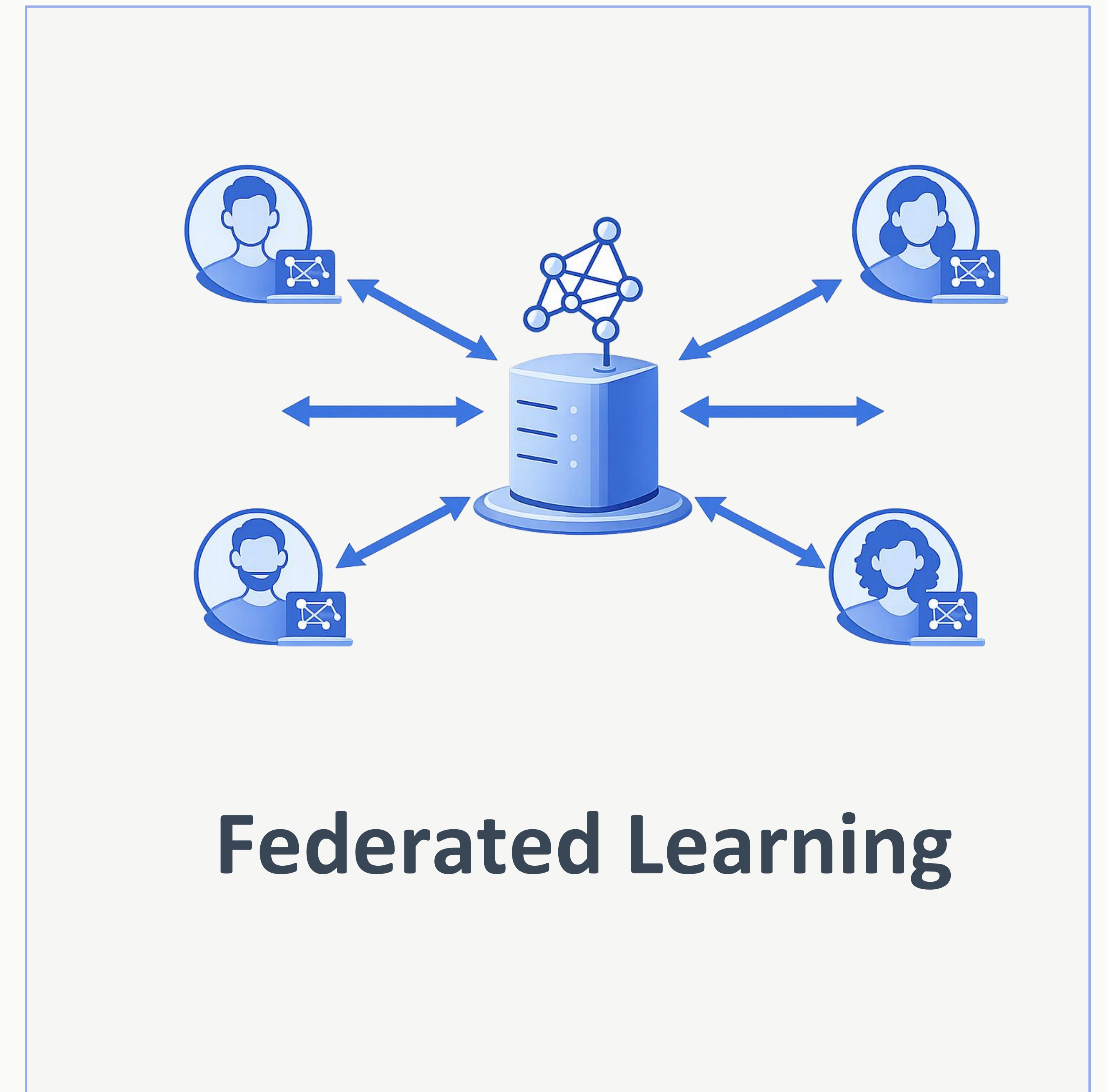
Federated Learning

- Shared model, local data
- Collaboration can improve sample efficiency
- Useful information is spread across clients



Contribution Is Costly

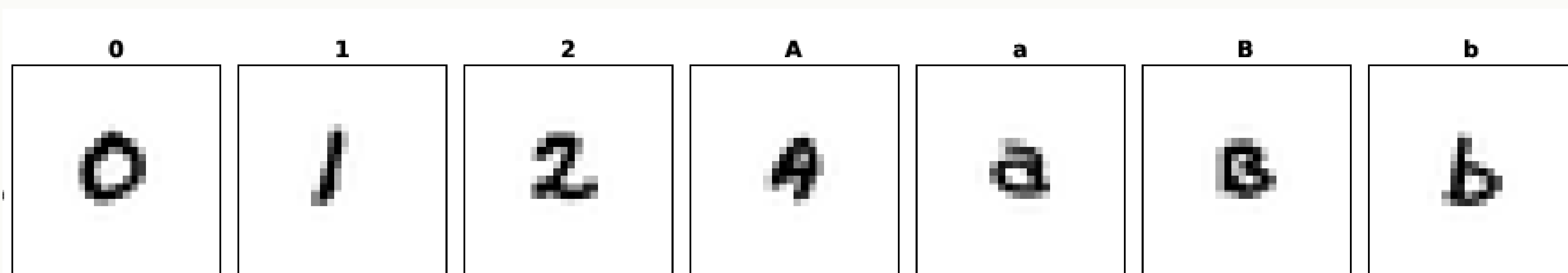
- Compute, bandwidth, privacy costs
- Global model benefits everyone
- Clients may prefer to free-ride



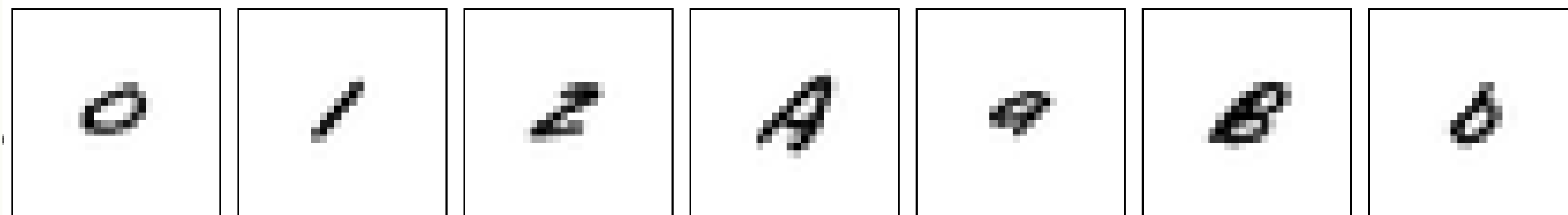
FL as a Game

- Agents care about local performance
- Data are not interchangeable
- Not only how much, but whose data

Agent 1

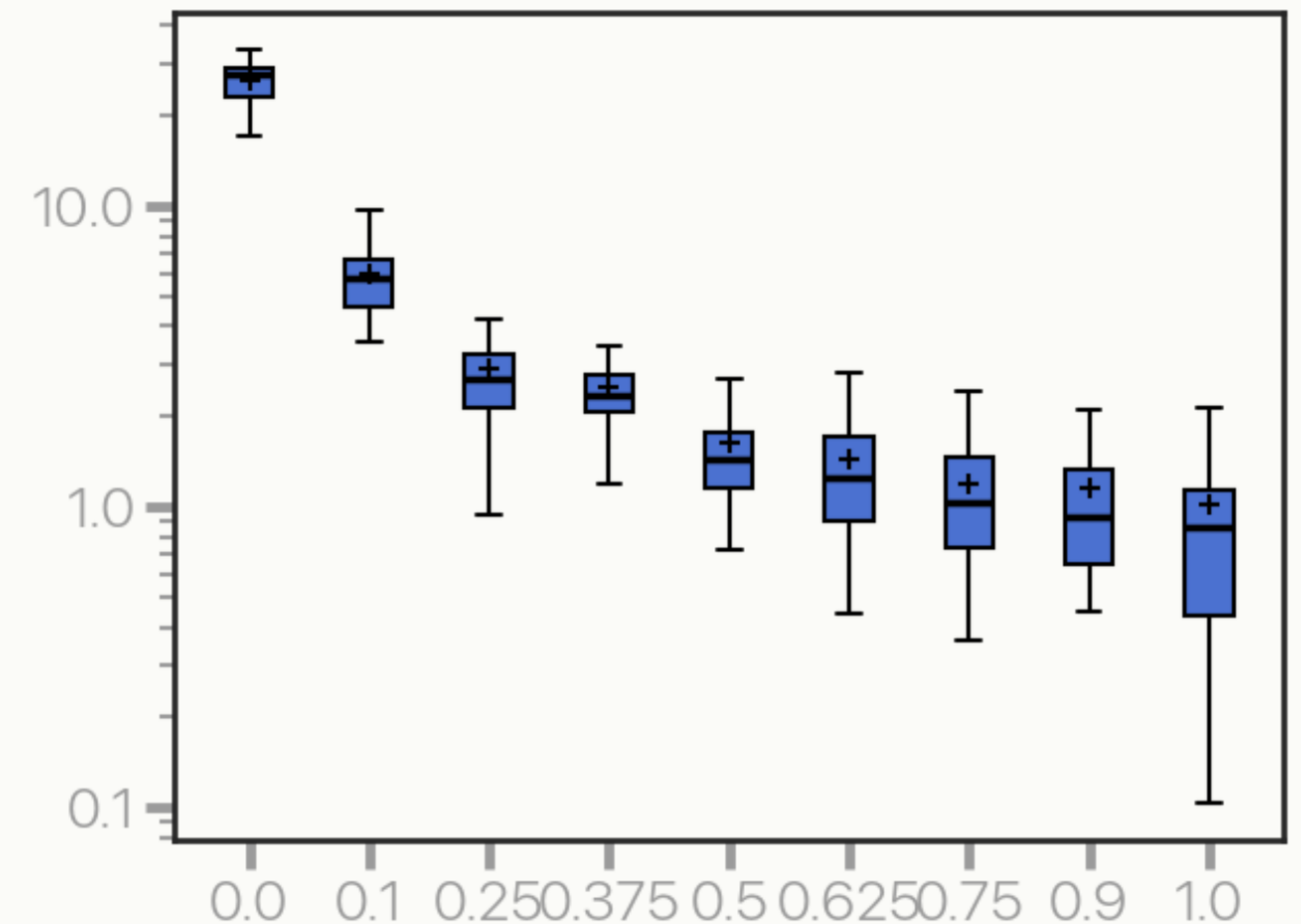


Agent 2



Test Loss on Agent 1's Data

400 Data Points



Fraction of samples from Agent 1

What Fails Without Coordination

- Strategic contribution
- Pure Nash may fail to exist
- Unbounded price of stability

Coordination

- Facilitate coordinated contribution
- Strategy-proof mechanism