Federated Learning with Mixture-of-Experts
A solution to data heterogeneity among clients

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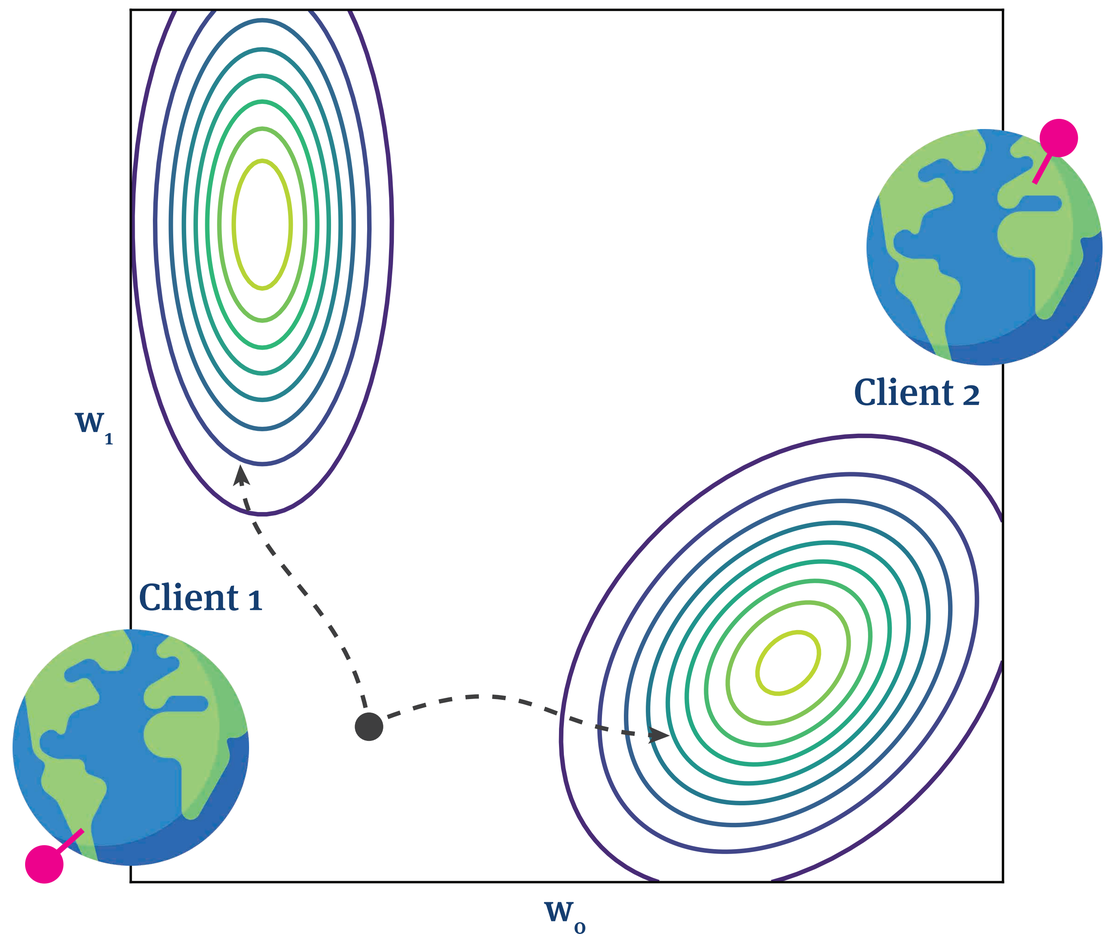
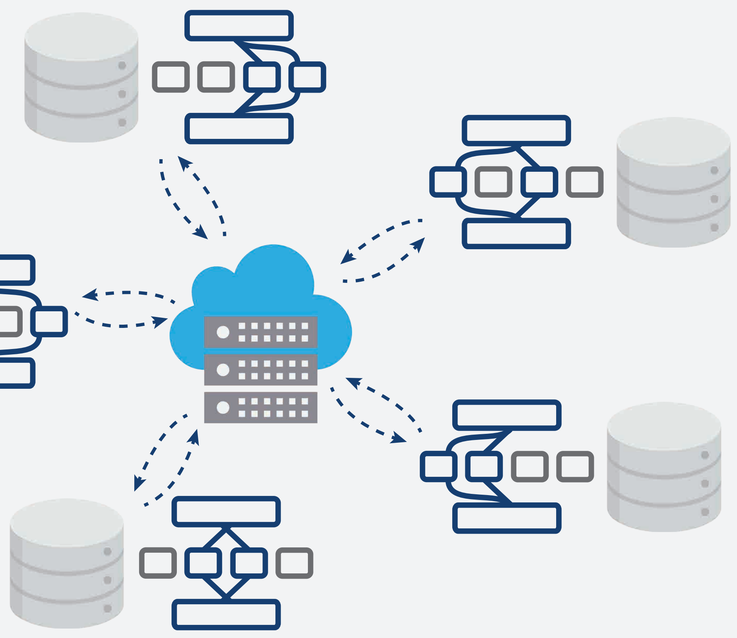
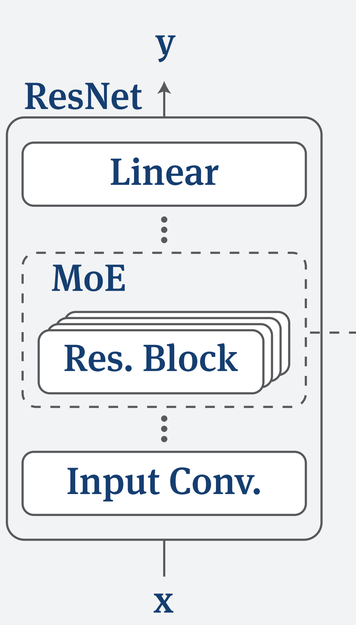
In Federated Learning scenarios with domain shifts between clients, local optimization trajectories may be inconsistent with the global empirical risk minimum direction.



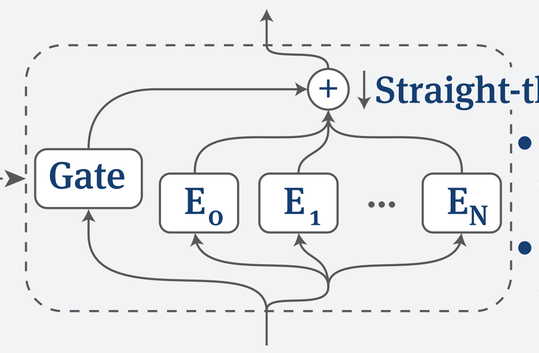


We propose using Mixture-of-Experts models to address this issue. This way, the federated model can automatically process different inputs with different network parameters.

Model



We replace the Residual Blocks of a ResNet with MoE versions of themselves

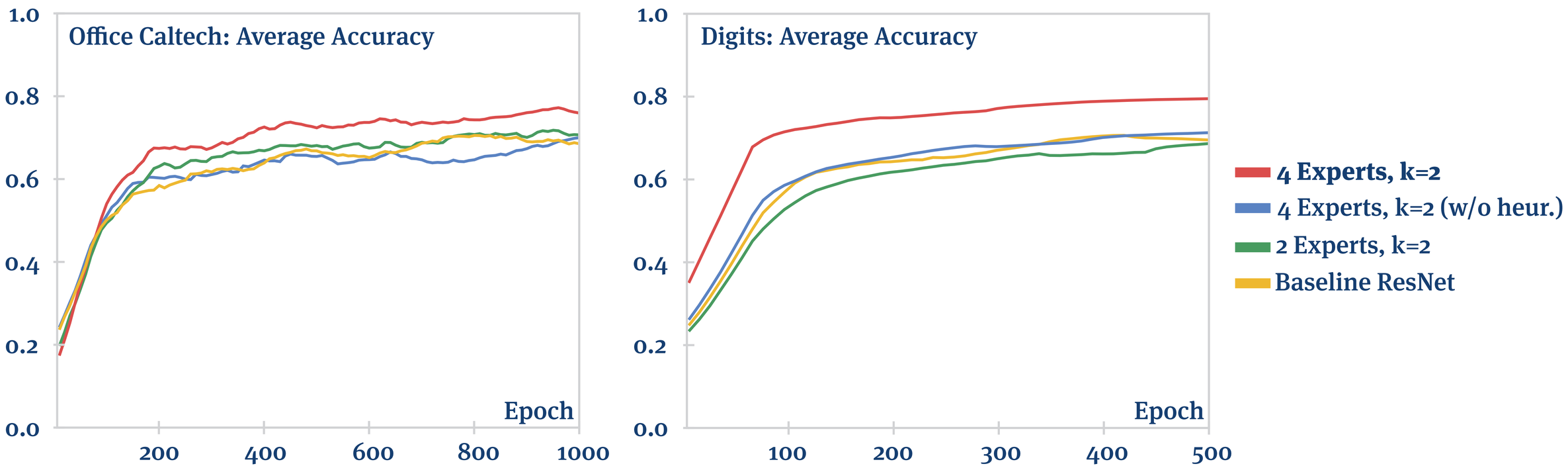


Straight-through gradients:
- **Training: all experts** are updated during backward.
- **Inference:** computation of unused experts is spared.

Gate network:
- Outputs a non-zero weight for the **top-k experts.**
- Modified "**noisy gating**" from [1].

Experiments

Federated Average Performance



[1] Shazeer, N. et al. (2017). Outrageously Large Neural Networks: The Sparsely-Gated Mixture-of-Experts Layer. In *International Conference on Learning Representations*.