PICSR: Prototype-Informed Cross-Silo Router for Federated Learning

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Motivation

- Data heterogeneity is common in Cross-Silo Federated Learning
- Stakeholders want to understand the differences among institutions
- Previous approaches focus on predictive performance
- **We develop an approach that is both explainable and performant**

Datasets

We evaluate on the Heart Disease Dataset [1], consisting of four different hospitals detecting heart disease

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Approach

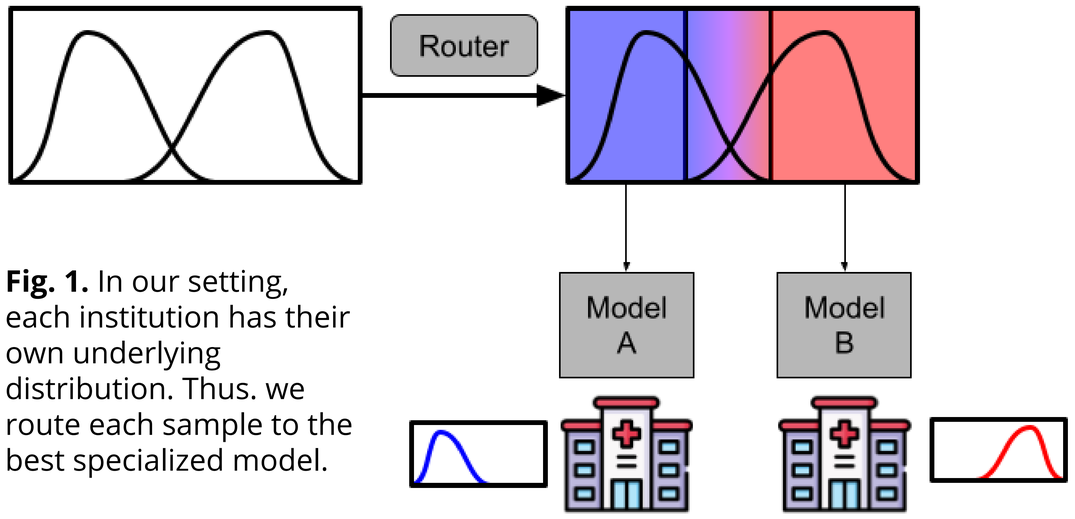


Fig. 1. In our setting, each institution has their own underlying distribution. Thus. we route each sample to the best specialized model.

Functional Architecture

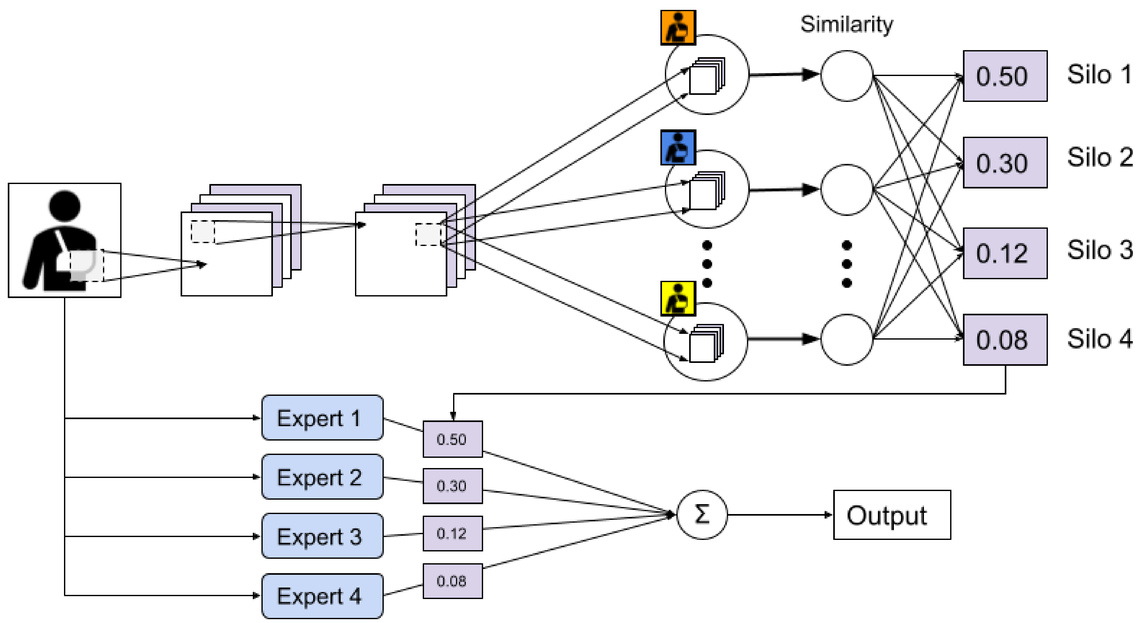


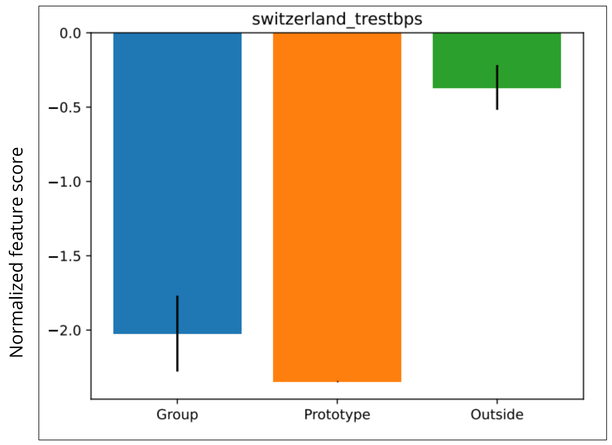
Fig. 2. Each prototype's similarity to the sample is computed by inverting their L_2 distance. The similarity scores are directly mapped to the final weighting vector of the experts through a linear layer.

[1] Terrail, Jean Ogier du, et al. "Flamby: Datasets and benchmarks for cross-silo federated learning in realistic healthcare settings"

Results

Heart Disease	Accuracy
Local	74.59 ± 4.83%
Ensemble	77.87 ± 0.63%
Ours	**80.47 ± 0.69%**

- We outperform both the local models and a naive ensemble



- Grounds predictions in the prototypes
- Switzerland's average patient has much lower resting blood pressure than other hospitals
- Patients routed to Switzerland also have much lower resting blood pressure