Tuning hyperparameters in federated learning is difficult:
1. Validation data is federated – cannot easily compute validation loss
2. Extreme resource limitations – cannot do many training runs
3. Evaluating personalization – personalized models require extra training to validate

Our contributions:
1. We adapt existing baselines such as random search and successive halving (SHA) to the federated setting and study their limitations
2. We propose a new algorithm called FedEx for tuning local hyperparameters that ameliorates the above challenges

FedEx: Tuning local hyperparameters

Most federated algorithms can be divided into two subroutines:
- \(\text{Loc}(T,w)\) that runs local training (e.g. SGD) on dataset \(T\) from initialization \(w\)
- \(\text{Agg}(w,\{w_i\})\) that aggregates results \(\{w_i\}\) of local training and uses them to update the initialization \(w\)

FedEx tunes the hyperparameters \(b\) of \(\text{Agg}\): 
- Can be formulated as an application of weight-sharing, a neural architecture search technique, to meta-learning
- Provably tunes the local step-size in the online convex optimization setting
- Applicable to any algorithm with the above structure

FedEx: Tuning local hyperparameters