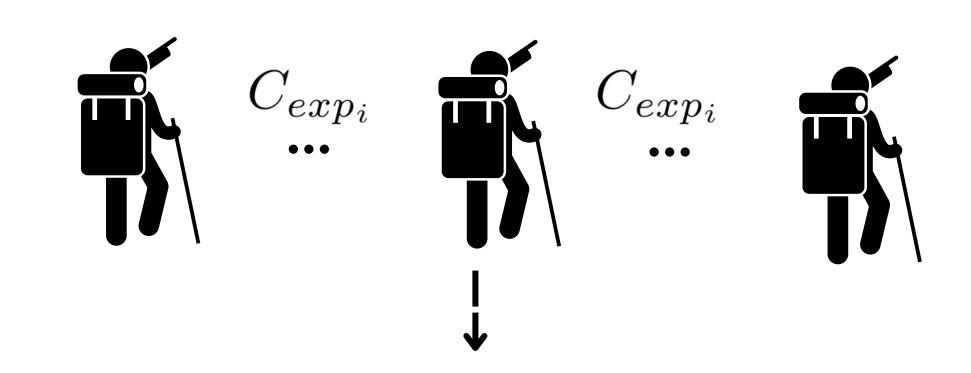
Federated Exploration Phase

FedLEx Server comunication

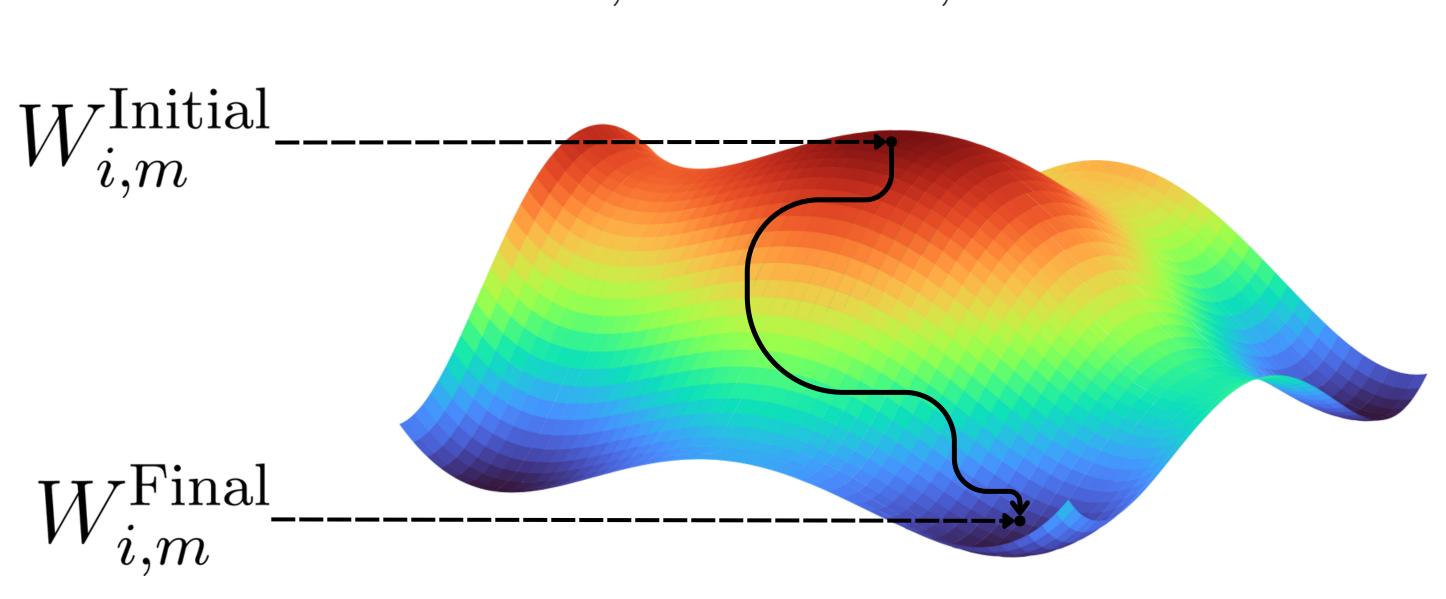
FedLEx Local update

1. A portion of client C_{exp} is selceted:



2. Each client C_{exp_i} calculates the deviations $D_{i,m}$ for each parameter m^{th} to captures the gradient deviation after Ex epochs and create its own G_{local} :

$$D_{i,m} = (W_{i,m}^{\text{Initial}} - W_{i,m}^{\text{Final}})^2$$



1) The Server aggregates each G_{local} in order to create G_{global} : 1) Clients use G_{qlobal} to adapt the m^{th} parameter:

$$G_{global,m} = \frac{1}{C_{exp}} \sum_{i=1}^{C_{exp}} \frac{G_{local}^{(i)} - \min(G_{local})}{\max(G_{local}) - \min(G_{local})}$$

Each element of G_{global} represents a gradient guiding parameter for the future client training session.

2) The server updates the matrix G_{qlobal} each round and then sends to the updating clients.

$$\Delta W \text{modulated}_{i,m} = \Delta W_{i,m} \times G_{\text{global},m}$$

Clients

Clients can modulate the gradient to navigate efficiently the loss function through the potential pitfalls of local minima.

2) Clients send back the ΔW updated gradient to the server.

