Federated Learning Paper Sharing

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FedOpt: Towards Communication Efficiency and Privacy Preservation in Federated Learning

Sparse Compression Algorithm

Goal: reduce the number of communication bits during the models training.

$$\Delta\theta = \mathcal{SGD}_n(\theta, D_{mini-batches}) - \theta$$

θ: Deep Neural Network parameters.
$\mathcal{SGD}_n$: refers to the set of gradient updates after n epochs of SGD on DNN (deep neural network) parameters θ during the sampling of mini-batches from local data
Once we have the updates δv...

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Input: temporal vector $\Delta\theta$, Sparsity Fraction q
Output: sparse temporal $\Delta\theta^*$
Initialization;
$num^+ \leftarrow top_q(\Delta\theta); num^- \leftarrow top_q(-\Delta\theta)$
$\Psi^+ \leftarrow mean(num^+); \Psi^- \leftarrow mean(num^-)$
if $\Psi^+ \geq \Psi^-$ **then**
  return $(\Delta\theta^* \leftarrow \Psi^+(\theta \geq \min(num^+)))$;
end
else
  return $(-\Delta\theta^* \leftarrow \Psi^-(\theta \geq \min(-num^-)))$;
end

Algorithm 1: SCA: Communication Efficiency in FedOpt

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