

Key Observations

- $\max_i \mathbf{e}_i^{-1} \lambda_i \equiv \mathbf{e}^{-1} (\sum_i \lambda_i)$

- Define $\lambda_i = x_i^p = (\sum_{j \in [s]} x_i(j))^p$

$$\bullet \text{ median}(e^{-1} \cdot \sum_i x_i^p) \equiv \sum_i x_i^p / (\ln 2)$$

- Can we compute $i^* = \operatorname{argmax}_i \mathbf{e}_i^{-1} \cdot x_i^p$ in one round?

- Can then compute $\mathbf{e}_{i^*}^{-1} x_{i^*}^p = \mathbf{e}_{i^*}^{-1} \left(\sum_j x_{i^*}(j) \right)^p$ in the second round

- Useful property:

- $\sum_i \mathbf{e}_i^{-1} \lambda_i \leq O(\log^2 n) \max_i \mathbf{e}_i^{-1} \lambda_i$ -- the largest value is significant

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0

Global

\mathbf{e}_1^{-1}

x_1^p

\mathbf{e}_n^{-1}

x_n^p

Local

$$\mathbf{e}_1^{-1}$$

$$x_1(1)^p$$

$$\mathbf{e}_1^{-1}$$

$$x_1(s)^p$$

$$\mathbf{e}_n^{-1}$$

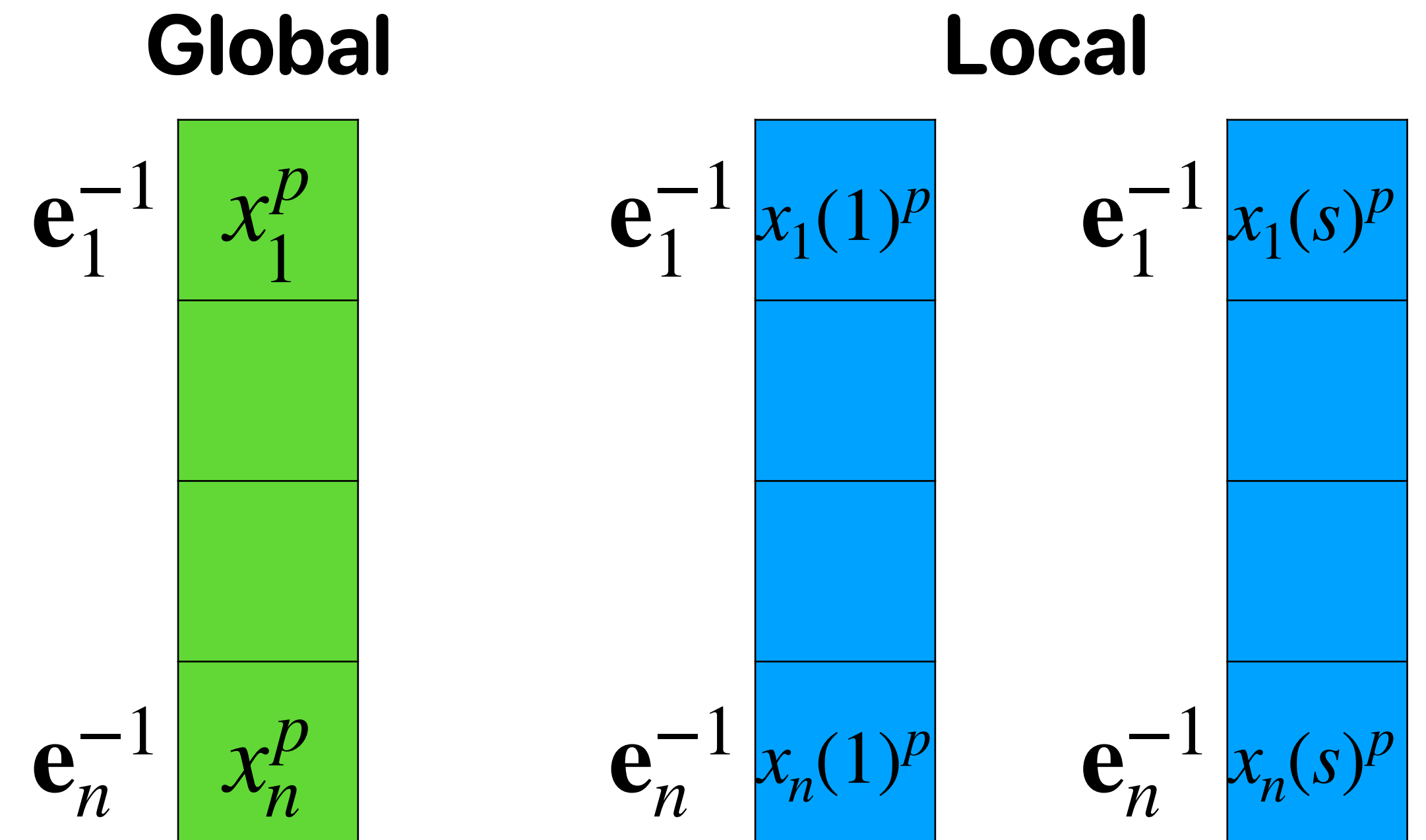
$$x_n(1)^p$$

$$\mathbf{e}_n^{-1}$$

$$x_n(s)^p$$

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 - Define $\lambda_i = x_i^p = (\sum_{j \in [s]} x_i(j))^p$
- $\text{median}(\mathbf{e}^{-1} \cdot \sum_i x_i^p) = \sum_i x_i^p / (\ln 2)$
- Can we compute $i^* = \text{argmax}_i \mathbf{e}_i^{-1} \cdot x_i^p$ in one round?
 - Can then compute $\mathbf{e}_{i^*}^{-1} x_{i^*}^p = \mathbf{e}_{i^*}^{-1} \left(\sum_j x_{i^*}(j) \right)^p$ in the second round
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High Level Ideas