

## Research on the combination of Top-K and Perm-K gradient sparsification algorithms for distributed setting

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The proposed research entails a theoretical analysis of the convergence rate and efficiency of a novel distributed optimization method, which incorporates independent segmentation of gradient coordinates (*PermK*) followed by a greedy coordinate selection process (*TopK*) for each gradient segment. Our findings indicate that the new method attains comparable results to state-of-the-art techniques, such as *MARINA-PermK* [Szlendak21] and *EF-TopK* [Alistarh18], in terms of zero-variance and general variance regimes, respectively. Additionally, the experimental performance of our approach is demonstrated through its application to quadratic problems and computer vision models.

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