

Research Highlight: A Fast Frequent Directions Algorithm for Low Rank Approximation

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Recently, a deterministic method, frequent directions (FD) is proposed to solve the high dimensional low rank approximation problem. It works well in practice, but experiences high computational cost. Prof. CHU Delin and his collaborators have established a fast FD algorithm in [1] for the low rank approximation problem, which implants a randomized algorithm, sparse subspace embedding (SpEmb) in FD. This new algorithm makes use of FD's natural block structure and sends more information through SpEmb to each block in FD. It is proven that the new algorithm produces a good low rank approximation with a sketch of size linear on the rank approximated. Its effectiveness and efficiency are demonstrated by the experimental results on both synthetic and real world datasets, as well as applications in network analysis.

Reference:

[1] D.Teng and D Chu, "A Fast Frequent Directions Algorithm for Low Rank Approximation", IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. 41 , No. 6: 1279 – 1293, 2019.