Department of Computer Science

St. Francis Xavier University

Presents

The Coupled Tensor-Train Decomposition with Incremental Approach for Tensor Completion

by

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Coupled tensor decomposition is the joint factorization of multiple datasets expressed in the form of coupled tensors, sharing one or more common latent factors. The coupled tensor decomposition improves the accuracy of sparse tensor completion by sharing information from the coupled modes, and finds applications in recommender systems, link prediction systems, computer vision etc. The existing coupled tensor decomposition methods are based on CP and Tucker decompositions. In our work, the Tensor-Train(TT) decomposition is used for efficient coupled tensor decomposition, as the TT decomposition shows linear complexity and stable results for higher order tensors. The Alternating Least Squares (ALS) algorithm is used to solve the optimization problem of coupled tensor-train decomposition. To handle live or real-time data, an efficient incremental tensor-train decomposition has been extended to coupled tensor-train multi-order incremental decomposition, as it overcomes the problem of repetitive decomposition of previous data when new data is added, and thus reduces the computational complexity. Preliminary experimental results on movielens and synthetic dataset, shows the coupled TT decomposition using ALS is more efficient in tensor completion.