



Matrix and tensor modeling in Artificial intelligence and data science

Mansoor Rezghi*

Department of computer science, Tarbiat Modares University, Iran

Abstract

Physics and engineering have been the primary sources of problems in matrix computations for several decades. However, in recent years, significant progress in artificial intelligence and data analysis has given rise to challenging problems that require efficient matrix techniques. Additionally, these fields contain vast data with multi-dimensional structures, for which tensors serve as the appropriate structure. In this lecture, we intend to discuss the main approaches and concepts in the field of utilizing matrix and tensor modeling in artificial intelligence and data science.

Keywords: Matrix computation, Tensor decomposition, Artificial Intelligence, Data science

Mathematics Subject Classification [2010]: 15A03, 15A23, 15B36

References

- [1] M. Rezghi, A novel fast tensor-based preconditioner for image restoration, **IEEE Transactions on Image Processing**, 9 (2017), 4499- 4508.
- [2] M. Rezghi, L. Elden, Diagonalization of tensors with circulant structure, **Linear Algebra and its Applications**, 435 (2011), 422-447.
- [3] M.Rezghi, S. M. Hosseini, L. Elden, Best Kronecker product approximation of the blurring operator in three dimensional image restoration problems, **SIAM Journal on Matrix Analysis and Applications**, 35 (2014), 1086-1104.
- [4] S Ahmadi, M Rezghi, Generalized low-rank approximation of matrices based on multiple transformation pairs, **Pattern Recognition**, 108(2020), 107545, 1–16.
- [5] T. Saeedi, M. Rezghi, A Novel Enriched Version of Truncated Nuclear Norm Regularization for Matrix Completion of Inexact Observed Data, **IEEE Transactions ON Knowledge and Data Engineering**, 34 (2020) , 519–530.
- [6] A. Noroozi, M. Rezghi, A Tensor-Based Framework for rs-fMRI Classification and Functional Connectivity Construction, **Frontiers in Neuroinformatics** 14(2020), 1–13.

*Rezghi@modares.ac.ir

- [7] P. Parvaside, M. Rezghi, A novel dictionary learning method based on total least squares approach with application in high dimensional biological data, **Advances in Data Analysis and Classification** , 15 (2021), 575–597.