

A Hybrid Convolutionary Neural Network and Low-rank Tensor Learning Algorithm for Tensor-on-Tensor Regression

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Abstract

The problem of predicting a set of tensorial outputs based on inputs of tensor form has been receiving increasing attention in recent years. This problem arises in various areas of mathematical, statistical and computational sciences, and generalizes the case of the widely-used scalar-on-scalar regression methods. In this paper, we develop a tensor-on-tensor regression framework using a hybrid of convolutionary neural networks and low-rank tensor learning algorithms. Our proposed framework integrates several promising approaches which have been developed previously to tackle this problem and extends their domain of applications. In particular, we demonstrate the advantage of this framework in comparison with traditional methods through an example of predicting the third-order tensors which arises within the procedures required for performing the time-homogeneous top-K ranking algorithm. Computational results are further provided which pertain to analysis of the U.S. stock market during the time period from January 1990 to December 2019.

Biography

Masoud Ataei studied in Department of Mathematics and Statistics in York University at Toronto, Canada. His research interests are Artificial Intelligence,

Robotics, Machine Learning and Big data concepts. He published many papers in international journals.