Accepted Manuscript

Bayesian Tensor Factorization for Multi-way Analysis of Multi-dimensional EEG

Yunbo Tang, Dan Chen, Lizhe Wang, Albert Y. Zomaya, Jingying Chen, Honghai Liu

 PII:
 S0925-2312(18)30995-0

 DOI:
 https://doi.org/10.1016/j.neucom.2018.08.045

 Reference:
 NEUCOM 19893



To appear in: Neurocomputing

Received date:15 July 2018Revised date:6 August 2018Accepted date:14 August 2018

Please cite this article as: Yunbo Tang, Dan Chen, Lizhe Wang, Albert Y. Zomaya, Jingying Chen, Honghai Liu, Bayesian Tensor Factorization for Multi-way Analysis of Multi-dimensional EEG, *Neuro-computing* (2018), doi: https://doi.org/10.1016/j.neucom.2018.08.045

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Bayesian Tensor Factorization for Multi-way Analysis of Multi-dimensional EEG

Yunbo Tang^a, Dan Chen^{a,*}, Lizhe Wang^{b,**}, Albert Y. Zomaya^c, Jingying Chen^d, Honghai Liu^e

 ^aSchool of Computer Science, Wuhan University, Wuhan, 430072, China
 ^bSchool of Computer Science, China University of Geosciences, Wuhan, 430074, China
 ^cSchool of Information Technologies, University of Sydney, Australia
 ^dNational Engineering Research Center for E-Learning, Central China Normal University, Wuhan, 430079, China

^e State Key Laboratory of Mechanical System and Vibration, School of Mechanical Engineering, Shanghai Jiao Tong University, Shanghai, 200240, China

Abstract

Factorization-based analysis of multi-dimensional EEG (Electroencephalography) has become increasingly important in neuroscience research and practices with the capability of extracting latent multi-way features. However, how to sift the most informative factors of routinely noisy EEG remains unclear especially under the circumstance of no a priori knowledge. This study proposes a Bayesian tensor factorization (BTF) model as a "one-stop" solution to the challenges. BTF assumes non-informative priori on potential distribution of factors and noise derived from exponential family distribution. A high-dimensional variational Bayesian inference method is designed to iteratively estimate the posterior distribution of potential factors. The factor vectors whose elements are "small" values can then be identified as redundancy and filtered out afterwards. Finally, the study enables a generic factorization-based method for multi-way analysis of brain states. Results from experiments on synthesized tensors indicate that (1) BTF excels in processing EEG tensor mixed with intensive white noises in comparison with the traditional counterparts; and (2) the non-informative components in factors can be filtered out effectively (rank

Preprint submitted to Journal of Neurocomputing

^{*}Corresponding author, dan.chen@ieee.org

^{**}Corresponding author, lizhe.Wang@gmail.com

Download English Version:

https://daneshyari.com/en/article/11021150

Download Persian Version:

https://daneshyari.com/article/11021150

Daneshyari.com