TAT

Tokyo University of Agriculture and Technology グローバルイノベーション研究院　公開セミナー
Institute of Global Innovation Research　**Institute of Global Innovation Research Open Seminar**

Recent Advances in Signal Processing and Machine Learning

Thursday, February 27 2020, 16:30 ~ 18:00

東京農工大学　小金井キャンパス BASE 会議室
Conference room, Graduate School of Bio-Applications and Systems Engineering (BASE), Koganei Campus, TUAT

言語/英語
Language/English
どなたでもご聴講
いただけます
Everyone is welcome
to attend.

16:30〜17:00
Speaker 1 : Anh-Huy Phan 特任准教授 (Skoltech)
Title : Novel Algorithms for Tensor-train approximation

Assistant professor of Center for Computational and Data-Intensive Science and Engineering
Skolkovo Institute of Science and Technology, Russia

Abstract:
Decompositions of tensors into factor matrices which interact through a core tensor, have found numerous applications in signal processing and machine learning. A more general tensor model that represents data as an ordered network of subtensors of order-2 or order-3 has, so far, not been widely considered in these fields, although this so-called tensor network (TN) decomposition has been long studied in quantum physics and scientific computing. In this article, we present novel algorithms and applications of TN decompositions, with a particular focus on the tensor train (TT) decomposition and its variants. The novel algorithms developed for the TT decomposition update, in an alternating way, one or several core tensors at each iteration and exhibit enhanced mathematical tractability and scalability for large-scale data tensors. For rigor, the cases of the given ranks, given approximation error, and the given error bound are all considered. The proposed algorithms provide well-balanced TT-decompositions and are tested in the classic paradigms of blind source separation from a single mixture, denoising, and feature extraction, achieving superior performance over the widely used truncated algorithms for TT decomposition.

17:00〜17:30
Speaker 2 : Simone Fiori
Title : Virtual attractive-repulsive potentials extended to manifolds

Associate professor of
Università Politecnica delle Marche, Italy
ING-IND/31- Elettrotecnica

Abstract:
In this talk I will summarize a non-linear control theory from a scientific work published in 2005 by Caltech researchers ("Virtual attractive-repulsive potentials for cooperative control of second order dynamic vehicles") and how it was used to control a small robot. Further, I will show how such control theory may be extended to smooth manifolds and, at the end,
I will mention how my students and I are trying to employ this theory to achieve self-guidance of an autonomous quadcopter drone.

17:30〜18:00
Speaker 3 : Md. Khademul Islam Molla
Title : Frequency recognition of short-time SSVEP signal in BCI paradigm using multistage parameter fusion

Professor of Computer Science and Engineering,
University of Rajshahi, Bangladesh

Abstract:
Brain-computer interface (BCI) refers to the recognition of brain activity leading to generate corresponding commands to interact with external devices. Due to its safety and high time resolution, electroencephalogram (EEG) based BCIs have become popular. Steady-state visual evoked potential (SSVEP) is an EEG particularly attractive due to high signal to noise ratio and robustness. Reducing calibration time in SSVEP is a demanding issue in the related research community. A multistage parameter fusion-based approached is studied to recognize the frequency of short-time SSVEP for brain-computer interface (BCI) implementation. Two reference signals are generated by averaging the training trial considering a leave-one-out (LOO) method. The signal of each channel is passed through a filterbank designed to cover all the stimulus frequencies as well as their harmonics.
A noticeable result is obtained using the method although further improvement is required. We also study on the improvement of frequency recognition with short-time SSVEP using data augmentation.

■共催 / Co-Organized by
グローバルイノベーション研究院 ライフサイエンス分野　田中チーム
Institute of Global Innovation Research, "LIFE SCIENCE" Tanaka Team

卓越大学院プログラム
Excellent Leader Development for Super Smart Society by New Industry Creation and Diversity

WISE-TUAT

JST CREST 人工知能「てんかん AI」田中プロジェクト
JST CREST Artificial Intelligence "Epilepsy AI" Tanaka Project

EPILEPSY AI
JST CREST

■お問合せ先／Contact
グローバルイノベーション研究院　工学研究院　田中　聡久
Institute of Global Innovation Research, Institute of Engineering
Prof. Toshihisa Tanaka
Email: tanakat (ここに@を入れてください) cc.tuat.ac.jp

詳細はホームページをご覧ください
Please refer to our website for more information
URL: https://www.tuat-global.jp
https://www.tuat-global.jp/english/

小金井キャンパス
Koganei Campus

30   28
34   18   19
講演会場 /Venue
東門
East Gate
13   11
12