Workshop on Mathematical Analysis of Biomedical Time Series

Gdańsk University of Technology, November 26–27, 2024

https://www.pawelpilarczyk.com/bts2024/

Aims and scope

Mathematical methods for the analysis of biomedical time series use advanced theoretical and algorithmic background, ranging from entropy to computational topology, and they often provide means for detection and quantification of complex phenomena. The purpose of the workshop is to stimulate dialogue between researchers that conduct mathematical analysis of biomedical time series data, such as ECG, blood pressure, EEG, or respiratory time series. In particular, selected scientists from Gdańsk University of Technology, Medical University of Gdańsk, University of Oslo, and Hungarian Wigner Research Centre for Physics are going to deliver talks at the workshop and discuss current and future ways of academic collaboration and joint research projects.

Organizing Committee

Grzegorz Graff, Paweł Pilarczyk, Justyna Signerska-Rynkowska

Location

All the talks and discussions will take place at Gdańsk University of Technology in the Faculty Council room no. 2/07 in the Nanotechnology Center, building no. 4 on the Campus Map.

Day One: Tuesday, November 26, 2024

9:30–10:00 – Marcell Stippinger (HUN-REN Wigner Research Centre for Physics, Budapest, Hungary): Dimensional Causality: observation-only Bayesian inference of causal relations between dynamical systems

10:00–10:30 – Zoltán Somogyvári (HUN-REN Wigner Research Centre for Physics & Axoncord LLC., Budapest, Hungary): *Topological inference of hidden common driver dynamics by anisotropic self-organizing neural networks*

10:30–11:30 – coffee break

11:30-12:00 - Maja Elstad (University of Oslo): Cardiorespiratory Interactions: Rhythms for Life

12:00–12:30 – Beata Graff (Medical University of Gdańsk): Analysis of breathing pattern variability as a tool for quantitative assessment of respiratory instability

12:30–13:00 – Paweł Pilarczyk (Gdańsk Tech): Using entropy-based indices to quantify coupling between heart rate and blood pressure

13:00 - lunch

19:00 - dinner

Day Two: Wednesday, November 27, 2024

9:30–10:00 – Justyna Signerska-Rynkowska (Gdańsk Tech): *Testing topological conjugacy of time series* 10:00–10:30 – John Rick Manzanares (Dioscuri Centre of Topological Data Analysis & University of the Philippines – Baguio): *Topology-informed machine learning models for ECG classification* 10:30–11:30 – coffee break

11:30-11:50 - Maciej Torhan (Gdańsk): Breathing pattern analysis using topological tools

11:50–12:10 – Marta Marszewska (Gdańsk Tech & Dioscuri Centre in Topological Data Analysis): A Quantitative Method for Analyzing Dynamical Systems Using Topological Data Analysis Tools

12:20–12:40 – Dorota Wejer (University of Gdańsk): Assessing Heart Rate Asymmetry According to Respiratory Phases

12:40–13:00 – Katarzyna Tessmer (Gdańsk Tech): *An Introduction to Impedance Cardiography* 13:00 – lunch

19:00 - dinner