

Schedule for Professors Dag Tjostheim (D.T.) and Hernando Ombao (H.O.)

May 25 : 15:00 – 17:00 Discussion with H.O. (51-17-04)

May 27: 10:00 – 12:00 Discussion with H.O. (63-511)

May 28: 10:00 – 12:00 Discussion with D.T. & H.O. (63-511)

May 29: Introductory talks for students at 63-511.

(i) 14:45 – 15:45

Finding communities and similarities in very large networks

Dag Tjostheim, University of Bergen

A survey will be given of clustering, classification and detection of similarities in very large networks containing up to millions of nodes and billions of edges. During the last decade there has been an intensive research activity in this area. It started with spectral clustering and modularity analysis and continued with neural nets with methods adopted from language analysis using modified CBOW and Skip-gram analysis. The relevant techniques include random walks on nets and cover both homogeneous and heterogeneous (multipartite) networks. The seminar will be kept at an elementary level with all main concepts defined and explained. Examples and possible applications will be briefly discussed.

(ii) 16:00 – 17:00

Topological Approach to Time Series Analysis

Hernando Ombao

Biostatistics Research Group STAT Program King Abdullah University of Science and Technology (KAUST) Saudi Arabia

The standard time-domain and frequency-domain analysis of time series data may not capture all of the interesting features of the data. In this lecture, we will give an overview of the topological data analysis (TDA) framework for time series. In particular, we will cover persistent homology, which is a key technique for TDA, for identifying features of the time series data that are overlooked by the classical second-moment properties (autocovariance, cross-covariance, autospectrum and cross-spectrum). We will discuss the limitations of TDA as well as its potential for solving problems on classification and discrimination and testing for differences between classes of signals. This talk is based on a collaborative project with Yuan Wang (Univ of South Carolina, USA) and Moo Chung (Univ Wisconsin, USA).

May 30 –31 : Mini Workshop on TDA