

Prof. Mamadou Mboup
University Reims - Champagne Ardenne

Title:

Algebraic approach for change point detection: application in biomedical signals

Abstract:

The occurrence of transient phenomena usually represents useful information in biomedical signals. Such occurrences result in abrupt change-points in the signal. Action potentials, QRS complex and spikes in EEG signal related with epilepsy are just some examples. The detection and localization of such change-points is difficult and stands as an important research challenge. This talk will give an overview of a recently proposed change-point detection algorithm, based on an algebraic framework: using elementary operational calculus, an explicit characterization of the change points locations is obtained in terms of short time window iterated integrals of the noisy signal. From this characterization, a joint spike detection and localization system is derived, where the decision function is implemented as the output of a digital Volterra filter.

Dr. Zoran Tiganj

French National Institute for Research in Computer Science and Control (INRIA)

Title:

Challenges in understanding of neural code

Description:

What code neurons use to convey information through action potentials (spikes) stands as a very intriguing question in neuroscience. This talk will first focus on recording of neural activity as an important step for better understanding of the neural code and then address the coding problem itself. Regarding the neural recordings, the emphasis will be on extracellular recordings, particularly on the problem of identifying the individual neural activity from the recorded mixture (spike sorting problem). A technique for spike sorting based on iterative application of Independent Component Analysis will be described. Further on, in the second part of the talk, different coding schemes will be discussed, especially the possible role of Local Field Potentials in the coding process.

Short biography:

Zoran Tiganj was born in Sinj, Croatia in 1983. He received master's degree in electrical engineering from University of Zagreb and PhD in signal processing from University of Science and Technology in Lille. He did his PhD at The French National Institute for Research in Computer Science and Control (INRIA). Currently he is working as a postdoctoral researcher at University of Versailles on project Cerebraptic. His main research interests are in the field of neuroengineering, in particular neural signal processing, neural coding, neuroprosthetics and brain stimulation.