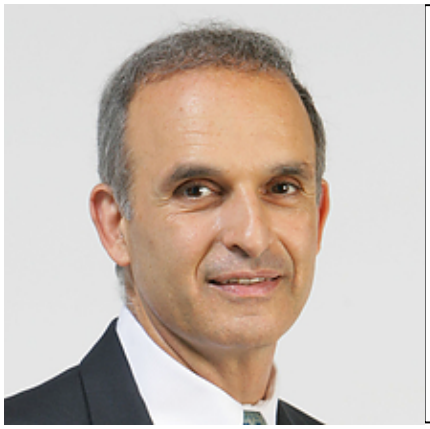
NJIT | INSTITUTE FOR DATA SCIENCE

Data Science Seminar Series

Deep Learning Techniques to Characterize Dynamics in Spatio-Temporal Neuroimaging Data



Joseph JaJa, Ph.D.

Interim Chair

Department of Electrical and Computer Engineering

University of Maryland

Date: Wednesday, April 28th, 2021

Time: 4:00 PM – 5:00 PM EDT

Location: Zoom Virtual Room

Web Link: https://njit-institute-for-data-science.eventbrite.com

We introduce two types of neural network architectures that enable the analysis of brain data dynamics and the generation of signature low-dimensional trajectories. The first type is based on reservoir computing, a very special recurrent neural network, and a low-dimensionality reduction technique. The resulting network can be used effectively for condition classification and the generation of low-dimensional trajectories of temporal data. The second type of architectures is based on an LSTM network and a dimensionality reduction layer. We show through detailed experimentation that such a network can uncover distributed spatio-temporal signatures with the low-dimensional trajectories capturing brain dynamics effectively. To test and validate our claims, we have used extensive data from the Human Connectome Project including working memory, theory of mind, and movie-watching data (Joint work with Manasij Venkatesh and Luiz Pessoa).

Dr. Joseph JaJa received his Ph.D. degree in Applied Mathematics from Harvard University after which he joined Penn State University as Assistant Professor of Computer Science. He moved to the University of Maryland in 1983 as Associate Professor in ECE and the Institute for Advanced Computer Studies (UMIACS). He served as Director of UMIACS from 1994-2004, Interim Vice President and Chief Information Officer of the University of Maryland's Office of Information Technology from 2010-2011, and as co-Technical Director of the NIST FFRDC in Cybersecurity from 2014-2015.

Prof. JaJa's current research interests involve big data, AI/Machine Learning, computational neuroscience, and high-performance computing. He has published extensively in several other areas and has received numerous awards including the IEEE Fellow Award, the ACM Fellow Award, the Internet2 IDEA Award, as well as several best paper awards.