IEEE CIS Seminar

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Big Data Analytics using Deep Learning and Information Theoretical Learning: Application to Time-Domain Astronomy

Abstract: Astronomy is facing a paradigm shift caused by the exponential growth of the sample size, data complexity and data generation rates of new sky surveys. To cope with a change of paradigm to data-driven astronomy new computational intelligence, machine learning and statistical approaches are needed. This talk will present two main applications. The first is to discriminate periodic versus non-periodic light curves, and then estimate the period of the periodic ones. The second application is the automated real-time transient detection in astronomical images. The aim is to achieve real-time detection of supernovae and other transients with the Dark Energy Camera. A novel transient detection pipeline was developed. The new pipeline was successfully tested online in February 2015 finding more than 60 supernovae in a few days of telescope observation.

Pablo A. Estévez received his professional title in electrical engineering (EE) from Universidad de Chile, in 1981, and M.Sc. and Dr.Eng. degrees from the University of Tokyo, Japan, in 1992 and 1995, respectively. He is a Full Professor with the Electrical Engineering Department, University of Chile, and former Chairman of the EE Department in the period 2006-2010.

Prof. Estévez is one of the founders of the Millennium Institute of Astrophysics (MAS), Chile, which was created in January 2014. He is currently leading the Astroinformatics/Astrostatistics group at MAS. He has been an Invited Researcher with the NTT Communication Science Laboratory, Kyoto, Japan; the Ecole Normale Supérieure, Lyon, France, and a Visiting Professor with the University of Tokyo. Prof. Estévez is an IEEE Fellow. He is currently the President of the IEEE Computational Intelligence Society (CIS) for the term 2016-2017.

His current research interests include big data, deep learning, neural networks, self-organizing maps, data visualization, feature selection, information theoretic-learning, time series analysis, and advanced signal and image processing. One of his main topics of research is the application of computational intelligence techniques to astronomical datasets, and EEG signals.