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KIOS Distinguished Lecture Series

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Adversarial learning and constant curvature manifolds to detect changes in graph streams

LECTURE ABSTRACT

Many fields, like physics, neuroscience, chemistry, and sociology, investigate phenomena by processing multivariate measurements advantageously represented as a sequence of attributed graphs. Graphs come in different forms, with variable attributes, topology, and ordering, making it difficult to perform a mathematical analysis in the graph space. Within this framework, we are interested in the identification of possible structural changes in the graph stream, a situation associated with time variance, faults, anomalies or events of interest.

Theoretic results show that, under mild hypotheses, the confidence level of an event detected in the graph domain can be associated with another confidence level in an embedding space; this enables the identification of events in the graph domain by investigating embedded data. The opposite holds. However, evaluation of distances between graphs and identification of an appropriate embedding for the problem at hand are difficult tasks which can be addressed by considering neural adversarial networks and constant curvature Riemann manifolds.

BRIEF BIO

CESARE ALIPPI, IEEE Fellow, is a Professor with the Politecnico di Milano, Milano, Italy and Università della Svizzera italiana, Lugano, Switzerland. Active on the international research front, Alippi seats in the Administrative Committee of the *IEEE Computational Intelligence Society*, the Board of Governors of the *International Neural Network Society* and the *European Neural Network Society*. He received the *IEEE CIS Outstanding Computational Intelligence Magazine Award* (2018), the 2016 International Neural Networks Society *Gabor award* and the 2016 IEEE Computational Intelligence Society *Outstanding Transactions on Neural Networks and Learning Systems Paper Award*; in 2013 the IBM Faculty award; in 2004 the IEEE Instrumentation and Measurement Society Young Engineer Award.

Current research activity addresses adaptation and learning in non-stationary environments, graphs learning and Intelligence for embedded and cyber-physical systems.