The concept of a Pseudo-polygon and its application to Big Data and IoT

Ahcène Bounceur

Associate Professor – HDR
Lab-STICC Laboratory - Université de Bretagne Occidentale, Brest, France

Ahcène Bounceur is an Associate Professor of Computer Science at the University of Brest (UBO), France. He is a member of the Lab-STICC Laboratory. He received a Ph.D. in Micro and Nano electronics at TIMA laboratory, Grenoble INP, France in 2007, the M.S. degrees from ENSIMAG, Grenoble, France in 2003 and the engineer degree in Operations Research from the University of Bejaia, Algeria in 2002. From 2007 to 2008, he was with TIMA, Grenoble INP as a postdoctoral fellow and a temporary professor. He has obtained the 3rd place of the Annual IEEE Test Technology Technical Council (TTTC-IEEE) Doctoral Thesis Contest at the VLSI Test Symposium, Berkeley, USA, in May 2007. His current research activities are focused on tools for the simulation of Wireless Sensor and IoT Networks, parallel models for accelerating simulations and predicting parameters in WSNs, and sampling methods for data mining. He was the coordinator of the project ANR PERSEPTEUR and filed a patent of the first french IoT platform for monitoring and treating the gestational diabetes, which is currently used by the University Hospital of Brest, France.

Abstract
Our world is digitized increasingly and everyday. In 2020, it is expected that over 70% of the population will live in or around cities. To guarantee a good quality of life, it is necessary to ensure fast and reliable services in all areas, in particular those that are based on the use of connected objects. This is one of the cornerstones of a smart city project. It will make possible the remote monitoring of sick patients close to real-time, the monitoring of the environment in order to know its evolution over time, to anticipate developments that can be harmful to health and the environment itself, and to accurately analyze the signals transmitted by the on-board sensors. To further develop domains such as eHealth or the monitoring of networks in the context of Smart Cities, fast and reliable design and data analysis tools are needed. Their objectives are to

study the realizability of such networks, their behavior in terms of energy consumption, safety, cost and other reliability parameters. Also, in the context of Big Data, they must be able to provide information about the studied system in order to anticipate special situations or to understand its functioning. This will help to improve that system as it is done in the Business Intelligence domain. Many efforts have been done to improve large business systems because, in general, it is easy to collect data about the employees of the company, for instance. Nowadays, thanks to the Internet of Things (IoT), it is possible to collect data from any person or object (building, roads, cars, etc.) in the world using sensors, Smartphones or any other communicating system. Thus, the methods used to improve the functioning of companies can be used to improve human life. As an example, methods allowing to improve taxi tours can be used to improve ambulance tours. In the first case, the objective is to increase profits while in the second case human lives can be saved.
This keynote aims to present - a new platform called CupCarbon that allows to design systems of connected objects mainly representing sensors and to prepare future deployments of large-scale IoT infrastructures for Smart cities in optimal conditions. This kind of platform will be a part of those systems in the world that will participate in the generation of Big Data; - a new concept called Pseudo-polygon together with an algorithm called LPCN allowing to extract complex clusters in a set of large data and used in the context of digital humanization and knowledge organization.

Keywords: Big Data, IoT, WSN, CupCarbon, Pseudo-polygon, LPCN, Clusters.