Colloquium d'Informatique de l'UPMC Sorbonne Universités

The new era of biology is computational

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Biology entered a new era, with bioinformatics producing biological data that are impossible nowadays to obtain with wet experiments. Soon scientists and clinicians will use new DNA technologies to detect mutations driving cancer and other diseases, identify new strains of pathogens, map the physiological effects of the microbial communities residing in our organs, track subtle changes in our immune repertoire, predict drug response, and make innumerable other contributions to our health and knowledge of complex biological systems. The scale and complexity of the data will vastly exceed anything the biological and medical community has faced before. Tackling these questions with advanced engineering, new computer algorithms and novel computational approaches is a challenge that will lead to revolutionize biology and medicine through deeper, ubiquitous use of DNA information. Among different examples, we shall present a computational approach to protein-protein interactions that we developed within a project on neuromuscular diseases. The project demands a high computational power to test billions of interactions, it run on the machines of the World Community Grid for more than 3 years, and provided a huge amount of information on the interaction of human proteins. High Performance Computing helped to obtain an unprecedented amount of information on protein-protein interactions between real partners but also, and most importantly, between non-partners.

Alessandra Carbone is Professor of Computer Science at UPMC and she has led the Analytical Genomics team since 2003. She is the director of the Laboratory of Computational and Quantitative Biology, created in January 2009 by CNRS and UPMC. She received the Prix Joliot-Curie in 2010 from the Ministère de la Recherche et de l'Enseignement Supérieur and from the EADS Foundation, and she was distinguished in 2012 with the Grammaticakis-Neuman Prize of the Académie des Sciences for "Integrative Biology". Since 2013 she is a senior member of the Institut Universitaire de France.

D'après une photo de Philippe Servent

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