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Mining biological networks in health and disease

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Insight into molecular interactions at systems level is critical for biological discovery and the understanding of disease mechanisms. Bioinformatics and Systems Biology strategies aim to develop appropriate computational and mathematical characterization of biological systems, in order to provide a holistic view of system properties and dynamics. I will discuss recent work in developing data mining protocols to target protein interactions, so as to link network topological properties to the underlying molecular features. Such community detection approaches are based on combinatorial optimization principles, involve data from various high throughput experiments and span weighted, consensus, dynamic networks and overlapping communities. The use of such methodologies will be illustrated in the context of gene expression and microbiome analysis in skin inflammatory disorders, so as to reveal the implication of specific biochemical pathways and the interplay of host-microbiome interactions.

Biography

Sophia Tsoka is Senior Lecturer in Bioinformatics at the Department of Informatics, King's College London. Prior to joining the college, she was Staff Scientist and Medical Research Council Fellow at the European Bioinformatics Institute in Cambridge, UK. Her expertise involves genome and disease data mining, analysis of protein interactions and community detection in complex networks. Recently, she has reported applications of these methodologies in the analysis of skin inflammation due to allergy and autoimmunity, including analysis of microbial communities in skin microbiome data.

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