Seminario Rubio de Francia

Conferencia

por

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Título:

Folding graph spectra. Extracting structural information hidden in the spectrum

Resumen: Here, we propose a new matrix function based on the Gaussianization of the adjacency matrix of a graph. It corresponds to a folding of the graph spectrum around the eigenvalue λ_{ref}. In particular, we study the trace of the new matrix function for two reference eigenvalues 0,-1 separately. In each case, we obtain bounds for this index in simple graphs. We also obtain formulas for the index in Erdös-Rényi random graphs as well as for the Barabási-Albert graphs. For $\lambda_{ref} = 0$, we show that in real-world networks this index is related to the existence of important structural patterns, such as complete bipartite subgraphs (bicliques). In the case $\lambda_{ref} = -1$ we show that this matrix function can be derived from physical models that consider the interaction between nearest and next-nearest neighbors in the graph. We also provide a combinatorial interpretation of this index of terms of subgraphs in the graph, and in terms of the competition pressure among agents in a complex system. Finally, we apply it to the study of magnetic properties of molecules emerging from spin interactions as well as to studying the temporal evolution of the international trade network in the period 1992-2002. In general, the Gaussian matrix function of the adjacency matrix of networks characterizes important structural information not described in previously used matrix functions of graphs. This is a joint work with Fawzi Al-Thukair and Ernesto Estrada.

Fecha: Martes, 12 de Noviembre de 2019.
Hora: 13:00 horas.
Lugar: seminario Rubio de Francia, edificio de Matemáticas, primera planta.
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