Publicacions més rellevants de la línia de recerca:
Combinatòria enumerativa

Referència: Giménez, O. and Noy, M. Asymptotic enumeration and limit laws of planar graphs. *J. Amer. Math. Soc.*, **22(2)** (2009), pp. 309–329.

Abstract: We present a complete analytic solution to the problem of counting planar graphs. We prove an estimate $g_n \sim g \cdot n^{-7/2}\gamma^n n!$ for the number g_n of labelled planar graphs on n vertices, where γ and g are explicit computable constants. We show that the number of edges in random planar graphs is asymptotically normal with linear mean and variance and, as a consequence, the number of edges is sharply concentrated around its expected value. Moreover we prove an estimate $g(q) \cdot n^{-4}\gamma(q)^n n!$ for the number of planar graphs with n vertices and $\lfloor qn \rfloor$ edges, where $\gamma(q)$ is an analytic function of q. We also show that the number of connected components in a random planar graph is distributed asymptotically as a shifted Poisson law $1 + P(\nu)$, where ν is an explicit constant. Additional Gaussian and Poisson limit laws for random planar graphs are derived. The proofs are based on singularity analysis of generating functions and on perturbation of singularities.

Referència: Drmota, M., Giménez, O. and Noy, M. Vertices of given degree in series-parallel graphs. Random Structures and Algorithms (en premsa). *Published Online: Nov 12 2009 1:44PM DOI: 10.1002/rsa.20290*

Abstract: We show that the numbers of vertices of a given degree k in several kinds of series-parallel labelled graphs of size n satisfy a central limit theorem with mean and variance proportional to n, and quadratic exponential tail estimates. We further prove a corresponding theorem for the number of nodes of degree two in labelled planar graphs. The proof method is based on generating functions and singularity analysis. In particular, we need systems of equations for multivariate generating functions and transfer results for singular representations of analytic functions.

Referència: de Mier, A. k-noncrossing and k-nonnesting graphs and fillings of Ferrers diagrams.

Combinatorica, **27(6)** (2007), pp. 699–720.

Abstract: We give a correspondence between graphs with a given degree sequence and fillings of Ferrers diagrams by nonnegative integers with prescribed row and column sums. In this setting, k-crossings and k-nestings of the graph become occurrences of the identity and the antiidentity matrices in the filling. We use this to show the equality of the numbers of k-noncrossing and k-nonnesting graphs with a given degree sequence. This generalizes the analogous result for matchings and partition graphs of Chen, Deng, Du, Stanley, and Yan, and extends results of Klazar to k ¿ 2. Moreover, this correspondence reinforces the links recently discovered by Krattenthaler between fillings of diagrams and the results of Chen et al.