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On the basic estimation problem for symmetric random graphs and networks

The pairwise interactions in a random graph or network may be expressed by a random array X , typically very large. When the distribution is invariant under separate or joint permutations of rows and columns, it gets a simple structure in terms of an underlying representation function f , and the problem is to estimate f from a single realization of X . This leads to a subtle filtering and rotation problem, which is essential for the modeling and analysis of real-life networks. My aim is to describe the problem, still essentially open, and to indicate some partial progress.