

Random graphs with prescribed degree distribution - scientific report

This report concerns a visit at Eurandom November 20 – December 2 2005. The purpose of the visit was to prepare for a coming postdoc stay (spring 2006) at Eurandom/TU Delft by initiating joint work with Remco van der Hofstad. The problems that we discussed are related to models for generating random graphs with prescribed degree distribution. Below are a few examples:

1. In [1], a number of algorithms are described for generating random graphs with prescribed degree distribution under the restriction that the resulting graph is required to be simple, that is, it cannot contain self-loops or multiple edges between vertices. We discussed how the results in this paper can be strengthened to hold under weaker moment assumptions on the degree distribution.
2. At present there are basically two types of random graph model: (i) models where the degree of a vertex depends on some weight associated with the vertex and (ii) models where vertices are added successively and the degree of a vertex is determined by how long it has been present in the graph (so called preferential attachment models). We discussed a possible model that interpolates between these two model types.
3. A natural generalization of the problem of generating random graphs with prescribed degree distribution is to consider spatial versions of the same problem. This problem was introduced in [2], where a model is described for generating stationary graphs on \mathbb{Z} . We discussed an alternative model, with close connections to spread-out percolation, that generalize more easily to higher dimensions.

Work at the points 2 and 3 will be continued when I return as a postdoc spring 2006 (the first point I will deal with together with Tom Britton and Anders Martin-Löf).

Apart from the collaboration with van der Hofstad, I also had discussions with a number of other people, which might lead to joint projects in the future. For instance, Frank Redig and Anne Fey introduced me to an interesting shape problems arising in the abelian sandpile model when sand is added at the origin of an infinite lattice.

To conclude, the visit at Eurandom was very fruitful and served as a valuable preparation for my coming postdoc stay there, allowing me to use the postdoc time more effectively.

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Gothenburg, 2005-12-11

[1] Britton, T., Deijfen, M. and Martin-Löf, A. (2005): Generating simple random graphs with prescribed degree distribution (www.math.su.se/~mia).

[2] Deijfen, M. and Meester, R. (2005): Generating stationary random graphs on \mathbb{Z} with prescribed iid degrees (www.math.su.se/~mia).