LabL5: G(n,p)

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1 Introduction

The laboratory required the generation of a graph G(n,p) with an ad-hoc algorithm and the handle of the FES.

2 Data Structure

The data structures used are:

1. dictionary of lists for the graph: the dictionary's keys are the index of vertices, and the associated list contains all the vertices with an edge with the key vertex.
2. list for nodes state: a list is used to store the nodes state. The indexes of the list represent the node and the item at a specific location and its state.
3. priority list for the fes: a priority list has been used to model the fes; the time of an event is the key sorting key in the list.

3 FES events

The fes's event represents the wake-up of a node. Every time a node wakes up, a new "inter-wake" is computed using an exponential distribution. To fulfill a simulation, the initial state of the fes must be initialized at the start of the simulation. The events are stored in a priority queue and ordered by the time of wake-up.

4 Generation of the G(n,p)

The generation of the G(n,p) is made by an ad-hoc algorithm. It is based on the degree binomial distribution of a vertex. Using a geometric sample, we compute the number of trials needed before connecting 2 edges, without trying every possible combination of edges. The algorithm reported has been taken from the first method of [BB05], where all details are explained.

References

[BB05] Vladimir Batagelj and Ulrik Brandes. Efficient generation of large random networks. *Phys. Rev. E*, 71:036113, Mar 2005.