Quasi-optimality of degree-greedy algorithm in random graphs with given degrees

Manuel Sáenz [1] [2], Matthieu Jonckheere[1]

[1] Instituto de Cálculo - UBA/CONICET

[2] Departamento de Matemática - FCEyN - UBA

Graphs constitute ubiquitous mathemathical objects that find applications in biology, physics and communications. In this context, the NP-hard problem of finding maximum independent sets[1] (i.e., maximum size subsets of vertices where no vertex is neighbor to any other) gains relevance. Here we give a sufficient condition to establish if an independent set constructing stochastic process finds a maximum independent set in a random graph with given degrees. To the best of our knowledge, this is the first result in this direction. Following previous analysis of explorations algorithms[2][3], we also establish a practical sufficient condition for the degree-greedy algorithm run on such graphs to find w.h.p. an independent set which contains the same proportion of vertices as one of maximum size, when the size of the graph tends to infinity. Using this condition, we find several relevant examples where it is met.

References

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