Communicability in Cubic Generalized Moore Graphs

Francesc Comellas

Universitat Politècnica de Catalunya, Barcelona

Generalized Moore graphs (GMG) are regular graphs which attain the generalized Moore bound, a bound related to the Moore bound for the degree-diameter problem. A GMG is a graph that, for a given order and degree, has minimal average distance. Thus, for a GMG of degree Δ the number of vertices at each distance $1, 2, 3, \ldots$ from any vertex is $\Delta, \Delta(\Delta - 1), \Delta(\Delta - 1)^2, \ldots$ with the last level not necessarily filled up. The girth g and diameter D of a GMG satisfy $g \geq 2D - 1$.

Generalized Moore graphs were introduced by Cerf, Cowan, Mullin and Stanton in a series of papers published in the 70's, see for example [1]. Further work, for the $\Delta = 3$ case, was published by McKay and Stanton [3]. Surprisingly not much research has been done on this topic since then and relevant questions, like if there are infinitely many GMG for each degree, are still open.

In my talk I will survey known results for cubic GMG and present work in progress with respect the communicability [2] (a measure of closed walks starting and ending at a node) and other related properties for non isomorphic cubic generalized Moore graphs with the same order.

References

[1] V.G. Cerf, D.D. Cowan, R.C. Mullin, R.G. Stanton, A partial census of trivalent generalized Moore networks, Lecture Notes in Math. 452 (1975) pp. 1–27.

[2] E. Estrada, The communicability distance in graphs, Linear Algebra Appl. 436 (2012) pp. 4317– 4328.

[3] B.D. McKay, R.G.Stanton, The current status of the generalised Moore graph problem, Lecture Notes in Math. 748 (1979) pp. 21–31.