

Assignatura: Teoria de grafos

Estudiant/a:

Data: 09/01/2019

Let G be an r -regular graph and let $r = \lambda_1 > \lambda_2 \geq \lambda_3 \geq \dots \geq \lambda_n$ be the eigenvalues of its adjacency matrix

a) show that the stability number $\alpha(G)$ satisfies $\alpha(G) \leq \frac{n \lambda_n}{r - \lambda_n}$

b) find an

u. Let G be an r -regular graph with n vertices and denote by $\tau(G)$ the number of spanning trees of G . Show that $\tau(G) \leq \frac{1}{n} \left(\frac{nr}{n-1} \right)^{n-1}$ and characterize the case of equality

First let G be an n -regular graph with $\tau(G)$ number of spanning trees ∇ . we need to show 2 cases:

$$1. \tau(G) \leq \frac{1}{n} \left(\frac{nr}{n-1} \right)^{n-1} = \frac{nr^n \cdot (n-1)^{-1}}{(n-1)^n \cdot (nr) \cdot n} = \frac{r^n (n-1)}{nr(n-1)^2}$$

$$\tau(G) = \frac{1}{n} \left(\frac{nr}{n-1} \right)^{n-1}$$

Let us consider the case with

$2m \leq 3n - 6$ that holds true if the graph is regular and ~~not~~ r -regularity supports the fact that nr in a graph is the equality of $n \cdot r = 2m$ with m standing for edges. $n-1$ standing for the amount of edges of an ~~sub~~ induced random tree? (non-cyclic graph)

Since the amount embedded in the graph should depend on the amount of vertices in the original graph, we have the following equation $\frac{nr}{n-1}$

However, it does not work until the power would be of $n-1$ that stands for the amount of edges in a random tree embedded the overall amount of tree should also be applied to each of the trees in particular, that is, divided by n vertices at the end.

Ar. mean $\frac{\sum x_i}{n} = \frac{x \cdot n}{n} = \frac{1}{n}(x \cdot n)$
 G. mean $\sqrt[n]{x_1 \cdot x_2 \cdot x_3 \cdot \dots \cdot x_n} = \sqrt[n]{(n \cdot x)^n} = \frac{1}{n} \cdot \sqrt[n]{(n \cdot x)^n} = \frac{1}{n} \cdot \frac{(n \cdot x)^n}{n^n} = \frac{1}{n} \cdot \left(\frac{n \cdot x}{n}\right)^n = \frac{1}{n} \cdot x^n = \frac{x^n}{n}$

$n=1$

$r(G) = 1$

$r(G)$

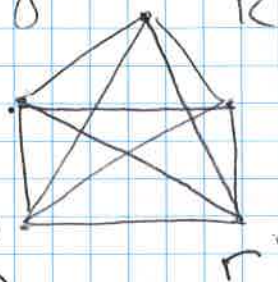
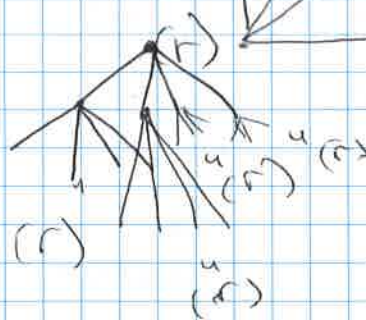
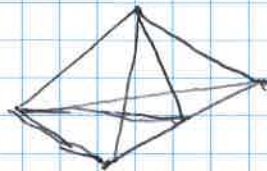
$n=2$

$r(G) = \frac{1}{2} \left(\frac{2 \cdot r}{2-1}\right)^{2-1} \leq \frac{1}{2} \left(\frac{2r}{1}\right)^1 = r$

$n=3$

$r(G) \leq \frac{1}{3} \left(\frac{3 \cdot r}{3-1}\right)^{3-1} = \frac{1}{3} \left(\frac{3r}{2}\right)^2 = \frac{3r^2}{4}$

n -vertices ^{types of} n possible trees. Since it's regular, each of these vertices has r different ways of growth.



K_5 3 reg.

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