Social Network Theory - Community Structure [23.03.2006]

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Finding Effective Movement

Effective Movement=Number of times going-Number of times coming back

Let i,j are two nodes with degree k_i and k_j respectively.

Probability of the agent taking edge(i,j)=1/k_i

A_{ij} is the Adjacency matrix

M=$(AD^{-1})^T$ [D is the diagonal matrix]

If A=

$$\begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$$

then D=

$$\begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$$

$M^T(1,2) = K_1^{-1} * A(2,1)$

$M_{11} = (A_{11}D11^{-1})^T$ where A_{11} is the truncated adjacency matrix and D_{11} is the truncated diagonal matrix

Probability of reaching w from s in n steps=$(M_{11}^n)_{sw}$

P(w,v)=$(M_{11}^1)_{sw} + (M_{11}^2)_{sw} + \cdots + (M_{11}^\infty)_{sw} * \frac{1}{k_w}$

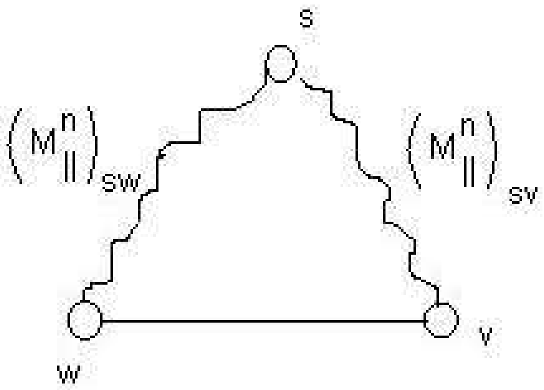
P=$D^{-1}[(M_{11}^1)_{sw} + (M_{11}^2)_{sw} + \cdots + (M_{11}^\infty)_{sw}]$

=$D^{-1}[(M_{11}^1) + (M_{11}^2) + \cdots + (M_{11}^\infty)]^T[s]$

=$D^{-1}[((I - M_{11})^{-1})]^T[s]$

Here s is the matrix with 1 in the s^{th} row.

$$e_{wv} = |P_w - P_v| \;\; [This\ is\ an\ experimental\ result]$$


s
$\left(M^n_{||}\right)_{sw}$
$\left(M^n_{||}\right)_{sv}$
w
v