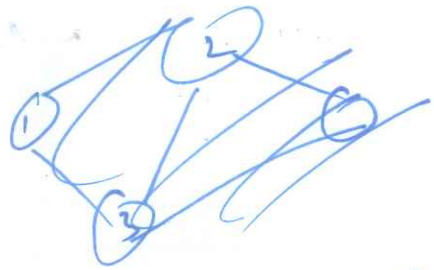
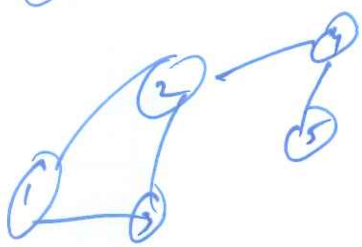
FAST PR





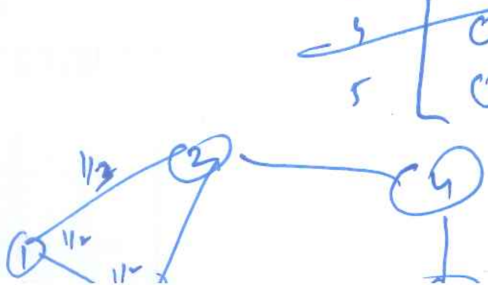
Adjacency Matrix —

$$S = \begin{array}{c|ccccc} & 1 & 2 & 3 & 4 & 5 \\ \hline 1 & 0 & 1 & 1 & 0 & 0 \\ 2 & 1 & 0 & 1 & 1 & 0 \\ 3 & 1 & 1 & 0 & 0 & 0 \\ 4 & 0 & 1 & 0 & 0 & 1 \\ 5 & 0 & 0 & 0 & 1 & 0 \end{array}$$

Transition Matrix — $A = D^{-1} \cdot S$

$$D = \begin{array}{c|ccccc} & 1 & 2 & 3 & 4 & 5 \\ \hline 1 & 2 & & & & \\ 2 & & 3 & & & \\ 3 & & & 2 & & \\ 4 & & & & 2 & \\ 5 & & & & & 1 \end{array} \Rightarrow D^{-1} = \begin{array}{c|ccccc} & & & & & \\ \hline 1 & 1/2 & & & & \\ 2 & & 1/3 & & & \\ 3 & & & 1/2 & & \\ 4 & & & & 1/2 & \\ 5 & & & & & 1/1 \end{array}$$

$$\cancel{A} = \begin{array}{c|ccccc} & 1 & 2 & 3 & 4 & 5 \\ \hline 1 & 0 & 1/2 & 1/3 & 0 & 0 \\ 2 & 1/2 & 0 & 1/2 & 1/2 & 0 \\ 3 & 1/2 & 1/3 & 0 & 0 & 0 \\ 4 & 0 & 1/3 & 0 & 0 & 1/1 \\ 5 & 0 & 0 & 0 & 1/2 & 0 \end{array}$$



$$A = \begin{array}{c|ccccc} & 1 & 2 & 3 & 4 & 5 \\ \hline 1 & 0 & 1/3 & 1/2 & 0 & 0 \\ 2 & 1/2 & 0 & 1/2 & 1/2 & 0 \\ 3 & 1/2 & 1/3 & 0 & 0 & 0 \end{array}$$

A^k = k-step Transition Matrix

$$A^2 = \begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{array} \begin{array}{c} \begin{array}{ccccc} 1 & 2 & 3 & 4 & 5 \end{array} \\ \begin{bmatrix} 0 & 1/2 & 1/2 & 0 & 0 \\ & & & & \\ & & & & \\ & & & & \\ & & & & \end{bmatrix} \end{array}$$

A^k = node similarity matrix

Zero-mean distribution : a distribution with mean is zero

$$R_{ij} = \begin{cases} \sqrt{s} & \text{with prob } \frac{1}{2s} \\ 0 & \text{with prob } 1 - 1/s \\ -\sqrt{s} & \text{with prob } \frac{1}{2s} \end{cases}$$

$d = 2$

$$R = \begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{array} \begin{array}{c} \begin{array}{cc} 1 & 2 \end{array} \\ \begin{bmatrix} -2.2 & 0 \\ 0 & 2.2 \\ 2.23 & 0 \\ -2.2 & -2.2 \\ 2.22 & 0 \end{bmatrix} \end{array}$$

$$N^{n \times d} = (\underbrace{A(A(A(A}_{k} \cdot R))))$$

$$L = \mathrm{diag}\left(\frac{d_i}{2m}\right)^{\beta}$$

m = no. of edges

d_i = degree of i

$$L = \begin{array}{c|ccccc} & 1 & 2 & 3 & 4 & 5 \\ \hline 1 & 2/10 & & & & \\ 2 & & 3/10 & & & \\ 3 & & & 2/10 & & \\ 4 & & & & 2/10 & \\ 5 & & & & & 1/10 \end{array}$$

$$N = (A \cdot \ldots \cdot A(A \cdot L \cdot R)))$$

$N_1 = A \cdot L \cdot R$

for $i = 2$ to k do

$\quad N_i = N_{i-1} \cdot A$

$$N = \alpha_1 N_1 + \alpha_2 N_2 + \cdots + \alpha_k N_k$$