

Big Data Processing: homework 7

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Exercise 1

The stochastic adjacency matrix:

$$M = \begin{bmatrix} 0 & 1/3 & 1 \\ 1 & 1/3 & 0 \\ 0 & 1/3 & 0 \end{bmatrix}$$

Solve for the equation: $M\lambda = \lambda$ (with $r_1 + r_2 + r_3 = 1$):

$$\begin{bmatrix} r_1 \\ r_2 \\ r_3 \end{bmatrix} = \begin{bmatrix} 1/3 \\ 1/2 \\ 1/6 \end{bmatrix}$$

Exercise 2

1.

$$M = \begin{bmatrix} 1/3 & 1/2 & 0 & 0 \\ 0 & 0 & 1/2 & 1 \\ 1/3 & 0 & 0 & 0 \\ 1/3 & 1/2 & 1/2 & 0 \end{bmatrix}$$

2.

$$A = \beta M + (1 - \beta) \left[\frac{1}{4} \right]_{4 \times 4} = \begin{bmatrix} 0.325 & 0.475 & 0.025 & 0.025 \\ 0.025 & 0.025 & 0.475 & 0.925 \\ 0.325 & 0.025 & 0.025 & 0.025 \\ 0.325 & 0.475 & 0.475 & 0.025 \end{bmatrix}$$

3. Initial value:

$$r^0 = \begin{bmatrix} 1/4 \\ 1/4 \\ 1/4 \\ 1/4 \end{bmatrix}$$

one iteration:

$$\mathbf{r}^1 = \mathbf{A}\mathbf{r}^0 = \begin{bmatrix} 0.2125 \\ 0.3625 \\ 0.1 \\ 0.325 \end{bmatrix}$$

Exercise 3

Perfect matchings:

