Page-to-Page Matrix of a Web

With any web we associate a matrix A called the page-to-page matrix that captures the links from one page to another. Let n_j denote the number of outgoing links on page j. Then we set

$$A = [a_{ij}] \quad \text{where} \quad a_{ij} = \begin{cases} \frac{1}{n_j} & \text{if } j \longrightarrow i \\ 0 & \text{otherwise} \end{cases}$$

For example, for our sample web here we have

$$A = \begin{array}{l} \text{outgoing page} \rightarrow \\ \begin{matrix} 1 \\ 2 \\ 3 \\ 4 \\ \uparrow \\ \text{incoming page} \end{matrix} \end{array} \begin{array}{c} \begin{matrix} 1 & 2 & 3 & 4 \end{matrix} \\ \begin{bmatrix} 0 & \frac{1}{2} & \frac{1}{2} & \frac{1}{3} \\ 0 & 0 & 0 & \frac{1}{3} \\ 0 & \frac{1}{2} & 0 & \frac{1}{3} \\ 1 & 0 & \frac{1}{2} & 0 \end{bmatrix} \end{array}$$

Note that $\sum_{i=1}^{n} a_{ij} = 1$ for any page j that links to some other page.