Week 7

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21.5 Write down the transition probability matrix for the example in Figure 21.2.

$$\begin{matrix} 0 & 0.5 & 0.5 \\ 1 & 0 & 0 \\ 1 & 0 & 0 \end{matrix}$$

21.6 Consider a web graph with three nodes 1, 2 and 3. The links are as follows: 1 → 2, 3 → 2, 2 → 1, 2 → 3. Write down the transition probability matrices for the surfer's walk with teleporting, for the following three values of the teleport probability: (a) α = 0; (b) α = 0.5 and (c) α = 1.

a)
$$\begin{matrix} 0 & 1 & 0 \\ 0.5 & 0 & 0.5 \\ 0 & 1 & 0 \end{matrix}$$

b)
$$\begin{matrix} 1/6 & 2/3 & 1/6 \\ 5/12 & 1/6 & 5/12 \\ 1/6 & 2/3 & 1/6 \end{matrix}$$

c)
$$\begin{matrix} 1/3 & 1/3 & 1/3 \\ 1/3 & 1/3 & 1/3 \\ 1/3 & 1/3 & 1/3 \end{matrix}$$

Consider figure 21.3: the sequence of vectors of probability. Repeat this example, but now start with the initial vector x_0 = [0.5, 0.3, 0.2]

$$\begin{matrix} 1/2 & 3/10 & 1/5 \\ 5/12 & 1/6 & 5/12 \\ 1/6 & 2/3 & 1/6 \end{matrix}$$

$\mathbf{X_0}$	1/2	3/10	1/5
$\mathbf{X_oP}$	1/3	1/3	1/3
$\mathbf{X_1}$	11/36	4/9	1/4
$\mathbf{X_2}$	41/108	359/1080	149/720

Similar, but with a vector where all probabilities are equal: [1/3, 1/3, 1/3]

$$\begin{matrix} 1/3 & 1/3 & 1/3 \\ 5/12 & 1/6 & 5/12 \\ 1/6 & 2/3 & 1/6 \end{matrix}$$

X_0	1/3	1/3	1/3
X_1	11/36	7/18	11/36
X_2	17/54	10/27	17/54
X_3	101/324	61/324	101/324

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