Written Homework for Markov model

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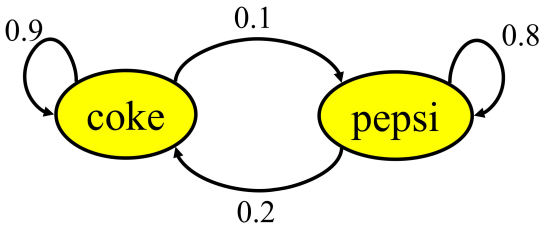

$$P = \begin{matrix} \text{coke} \\ \text{pepsi} \end{matrix} \begin{bmatrix} 0.9 & 0.1 \\ 0.2 & 0.8 \end{bmatrix} \begin{matrix} \text{coke} \\ \text{pepsi} \end{matrix}$$

Q1 now pepsi → coke

$$[0 \quad 1] \begin{bmatrix} 0.9 & 0.1 \\ 0.2 & 0.8 \end{bmatrix} = [0.2 \quad 0.8]$$

coke → coke

$$[1 \quad 0] \begin{bmatrix} 0.9 & 0.1 \\ 0.2 & 0.8 \end{bmatrix} = [0.9 \quad 0.1]$$

P(pepsi → coke → coke) = 0.2 × 0.9 = 0.18

∴ 0.18

Q2 now coke → pepsi

$$[1 \quad 0] \times \begin{bmatrix} 0.9 & 0.1 \\ 0.2 & 0.8 \end{bmatrix} = [0.9 \quad 0.1]$$

pepsi → pepsi

$$[0 \quad 1] \times \begin{bmatrix} 0.9 & 0.1 \\ 0.2 & 0.8 \end{bmatrix} = [0.2 \quad 0.8]$$

P(coke → pepsi → pepsi → pepsi) = $0.1 \times (0.8)^2 = 0.064$

∴ 0.064

Q3 60% now coke → coke

$$[1 \quad 0] \times \begin{bmatrix} 0.9 & 0.1 \\ 0.2 & 0.8 \end{bmatrix}^3 = [0.781 \quad 0.219]$$

40% now Pepsi → coke

$$[0 \quad 1] \times \begin{bmatrix} 0.9 & 0.1 \\ 0.2 & 0.8 \end{bmatrix}^3 = [0.438 \quad 0.562]$$

(0.6 × 0.781) + (0.4 × 0.438) = 0.6438

∴ 0.6438