

Given $P = \begin{matrix} & \begin{matrix} 0 & 1 & 2 \end{matrix} \\ \begin{matrix} 0 \\ 1 \\ 2 \end{matrix} & \begin{bmatrix} 0.1 & 0.1 & 0.8 \\ 0.2 & 0.2 & 0.6 \\ 0.3 & 0.3 & 0.4 \end{bmatrix} \end{matrix}$

Determine

a) $\text{pr}\{X_3 = 1 \mid X_1 = 0\}$

b) $\text{pr}\{X_2 = 1 \mid X_0 = 0\}$

Ans:

$$P^2 = \begin{matrix} & \begin{matrix} 0 & 1 & 2 \end{matrix} \\ \begin{matrix} 0 \\ 1 \\ 2 \end{matrix} & \begin{bmatrix} 0.1 & 0.1 & 0.8 \\ 0.2 & 0.2 & 0.6 \\ 0.3 & 0.3 & 0.4 \end{bmatrix} \begin{bmatrix} 0.1 & 0.1 & 0.8 \\ 0.2 & 0.2 & 0.6 \\ 0.3 & 0.3 & 0.4 \end{bmatrix} \end{matrix}$$

a) $\text{pr}\{X_3 = 1 \mid X_1 = 0\}$

$= P^2_{01}$

$= [0.1 \ 0.1 \ 0.8] \begin{bmatrix} 0.1 \\ 0.2 \\ 0.3 \end{bmatrix}$

$= 0.27$

$$\begin{array}{r} 0.01 \\ + 0.02 \\ + 0.24 \\ \hline 0.27 \end{array}$$

(without obtaining all entries of the $M_{X_t} P^2$)

b) $\text{pr}\{X_2 = 1 \mid X_0 = 0\}$

$= P^2_{01} = 0.27$

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