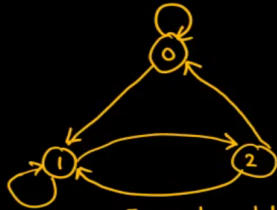


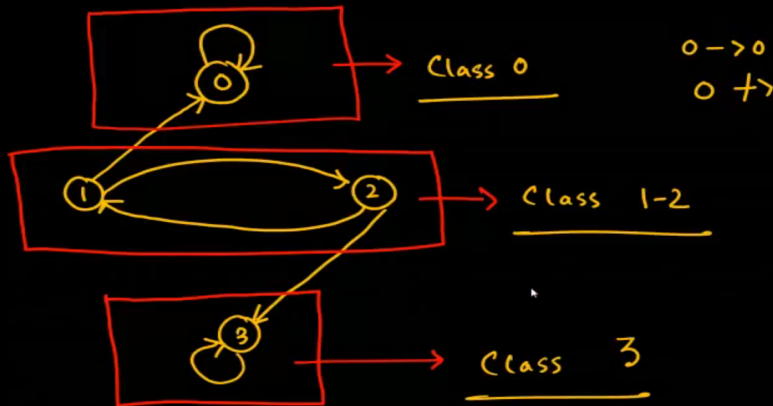
Reducible MC

$0 \rightarrow 0$
 $0 \rightarrow 1$
 $1 \rightarrow 2$
 $2 \rightarrow 1$

Transient State $\rightarrow 0$
 Recurrent state $\rightarrow 1, 2$



Irreducible MC



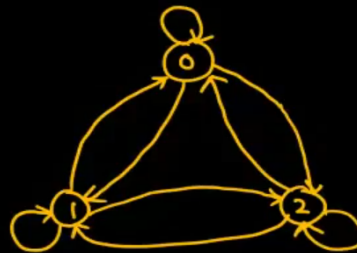
$$P_{i \rightarrow j}(n) \quad \checkmark$$

$$P_{02}(1) = 0.3 = A_{02}$$

$$P_{12}(1) = 0.2$$

$$P_{21}(1) = 0.2$$

$$\begin{aligned}
 P_{02}(2) &= A_{00} \times A_{02} + A_{01} \times A_{12} \quad \rightarrow 1 \\
 &\quad + A_{02} \times A_{22} \quad \rightarrow 2 \\
 &= 0.5 \times 0.3 + 0.2 \times 0.2 + 0.3 \times 0.1 \\
 &= 0.22
 \end{aligned}$$



$0 \rightarrow 0$
 $0 \rightarrow 2$
 $0 \rightarrow 1$
 $1 \rightarrow 2$
 $0 \rightarrow 2$
 $2 \rightarrow 2$

	0	1	2
0	0.5	0.2	<u>0.3</u>
1	0.6	0.2	<u>0.2</u>
2	0.1	<u>0.8</u>	0.1

$$P_{10}(2) = 0.6 \times 0.5 + 0.2 \times 0.6 + 0.2 \times 0.1$$

$$= \boxed{0.44}$$

$$A = \begin{bmatrix} 0.5 & 0.2 & 0.3 \\ 0.6 & 0.2 & 0.2 \\ 0.1 & 0.8 & 0.1 \end{bmatrix}$$

$$A * A = \begin{bmatrix} 0.5 & 0.2 & 0.3 \\ 0.6 & 0.2 & 0.2 \\ 0.1 & 0.8 & 0.1 \end{bmatrix} * \begin{bmatrix} 0.5 & 0.2 & 0.3 \\ 0.6 & 0.2 & 0.2 \\ 0.1 & 0.8 & 0.1 \end{bmatrix}$$

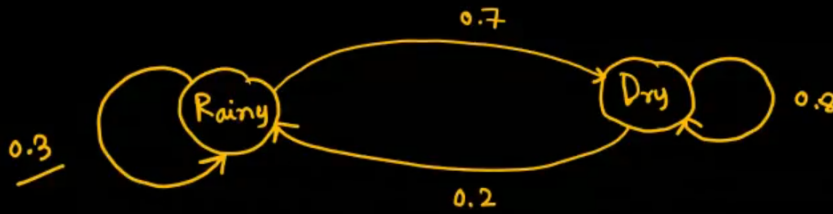
$$A^2 = \begin{bmatrix} 0.4 & 0.38 & \underline{0.22} \\ \underline{0.44} & 0.32 & 0.24 \\ 0.54 & 0.26 & 0.20 \end{bmatrix}$$

A
(3x3)

$P_{ij}(2)$

$$P_{ij}(2) = A^2_{ij}$$

$$P_{ij}(n) = A^n_{ij}$$



$$P(\vec{B}|\vec{A})$$

$$P(\text{Rainy}) = 0.4 \quad P(\text{Dry}) = 0.6$$

Rainy \rightarrow Rainy \rightarrow Dry \rightarrow Dry ?

Soln:

$$A = \begin{matrix} & \begin{matrix} R & D \end{matrix} \\ \begin{matrix} R \\ D \end{matrix} & \begin{bmatrix} 0.3 & 0.7 \\ 0.2 & 0.8 \end{bmatrix} \end{matrix}$$

$$\pi = [0.4 \quad 0.6]$$

$$Q = P(R) * P(\overset{\downarrow}{R}|\overset{\downarrow}{R}) * \overset{\downarrow}{P(D|\overset{\downarrow}{R})} * P(D|\overset{\downarrow}{D})$$

$$= 0.4 * 0.3 * 0.7 * 0.8$$

$$= \boxed{} \text{ Ans.}$$