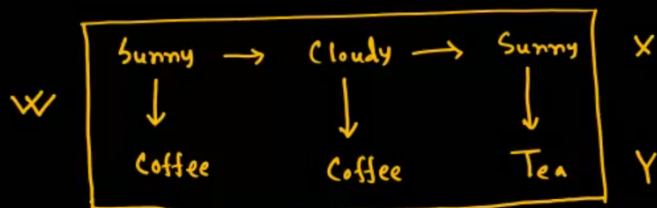


# Hidden Markov Model



$$P(A|B)$$

$$P(Y = cc \rightarrow cc \rightarrow T, X = S \rightarrow C \rightarrow S)$$

$$P(X_1 = S) * P(Y_1 = cc | X_1 = S) * P(X_2 = C | X_1 = S) *$$

$$P(Y_2 = cc | X_2 = C) * P(X_3 = S | X_2 = C) * P(Y_3 = T | X_3 = S)$$

$$\pi = \begin{bmatrix} R & C & S \\ 0.2 & 0.2 & 0.6 \end{bmatrix} \rightarrow \text{Equilibrium state}$$

argmax

$$P(X = x_1, x_2, x_3, \dots, x_n \mid Y = y_1, y_2, y_3, \dots, y_n)$$

$$X = x_1, x_2, x_3, \dots, x_n$$

$$= \underset{X = x_1, x_2, x_3, \dots, x_n}{\operatorname{argmax}} \frac{\overset{\vee}{P(Y|X)} * \overset{\vee}{P(X)}}{\underbrace{\overset{\vee}{P(Y)}}_1}$$

$$P(Y|X) = P(y_1|x_1) * P(y_2|x_2) * P(y_3|x_3) * \dots * P(y_n|x_n)$$

$$P(X) = P(x_0) * P(x_1|x_0) * P(x_2|x_1) * \dots * P(x_i|x_{i-1})$$

$$P(Y|X) = \prod_{i=1}^n (P(y_i|x_i))$$

$$P(X) = \prod_{i=1}^n (P(x_i|x_{i-1}))$$

argmax

$$\prod (P(y_i|x_i) * P(x_i|x_{i-1}))$$

$$X = x_1, x_2, x_3, \dots, x_n$$