IME625: Stochastic Processes

2021-22 Sem-II

Homework-4

Suppose that whether it rains today or not depends on the weather conditions of the past two days. Let $X_n = 1$ if it rains on n-th day, otherwise it's zero. Clearly $\{X_n : n = 0,1,2, \dots\}$ is not a Markov Chain, as $X_{n+1}|X_n$ is influenced by X_{n-1}. Think of a way to represent states of the system so that the new sequence of random variables or vectors constitutes a Markov chain.

Considering $P(X_{n+2} = 1|X_{n+1} = 1, X_n = 1) = 0.3$, $P(X_{n+2} = 1|X_{n+1} = 1, X_n = 0) = 0.2$, $P(X_{n+2} = 1|X_{n+1} = 0, X_n = 1) = 0.1$, and $P(X_{n+2} = 1|X_{n+1} = 0, X_n = 0) = 0.05$ for all n, construct the transition probability matrix of your Markov chain.