AI1110 - Probability and Random Variables
Assignment 13

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Outline

Question

Example-15.24

Referring to the imbedded Markov chain formulation. using the transition matrix the system of equations in $q_j = \Sigma q_j p_{ij}$ reduces to

$$q_j = q_0 a_0 + \sum_{i=1}^{j+1} q_i a_{j-i+1}$$

.Then find Q(z)?

Solution

Solution

$$Q(z) = \sum_{j=0}^{\infty} q_j z^j$$

$$A(z) = \sum_{k=0}^{\infty} a_k z^k$$

so by using the given equation, we get

Solution

$$Q(z) = q_0 \sum_{j=0}^{\infty} a_j z^j + \sum_{j=0}^{\infty} \sum_{i=1}^{j+1} q_i a_{j-i+1} z^j$$

$$Q(z) = q_0 A(z) + \sum_{i=1}^{\infty} q_i z^i \sum_{m=0}^{\infty} a_m z^m . z^{-1}$$

$$Q(z) = q_0 A(Z) + (Q(z) - q_0) A(z)/z$$

From this we get,

Solution

$$Q(z) = \frac{q_0(1-z)A(z)}{A(z)-z}$$