chapter 04

4.1 Introduction

Markov chain

Definition

Transition Probability Matrix

Forecasting the Weather

Transforming a Process into a

Markov Chain

A Random Walk Model

A Gambling Model

4.2 Chapman-Kolmogorov Equations

Definition

Proof of C-K Equations

Proof of C-K Equations

Unconditional distribution of the state at time n

Unconditional probability of the state at time n

Calculate the probability that a Markov chain enters

a specified set of states A by time n

4.3 Classification of States

Definition

Properties of Accessible and Communicate

Proof of Property (iii)

States in the same Class and Irreducible Chain

The first passage time and the first-passage-time

probability

The calculation of fij (n) and the recurrence time

The reaching probability fij

recurrent and transient

Interpretation of recurrence

Interpretation of transient

Determine the recurrence by Pn ii

In a finite-state Markov chain not all states can be

transient

Recurrence is a class property

Transience is a class property

On the Ultimate Instability of the

Aloha Protocol

4.4 Limiting Probabilities

Definition

Periodicity

Theorem 4.1

Theorem 4.1 Remarks

Proposition 4.3

4.5 Some Applications

4.5.1 The Gamblers Ruin Problem

Definition

The Gamblers Ruin Problem

4.6 Mean Time Spent in Transient States

Definition

Mean Time Spent in Transient States

Determine fij from PT

4.7 Branching Process

Definition

The Mean of a Branching Process

The probability that the population will eventually

die out