

Part 1: Markov Chains

Chapter 1: Introductions

Theorem 1.1: Perron-Frobenius theorem

Mean first passage times

Kemeny constant

Theorem 1.2

Second eigenvector and clustering

Theorem 1.3

Chapter 2: Markov Chains and big data

Theorem 2.1

Theorem 2.2

Chapter 3: Markov Chains of Public Transport Network

Waiting graph

Travel graph

multimodality

Validation by Perron eigenvector

Clusters

Big data example

Chapter 4: Improve and optimize public transport network

Accessibility to critical areas

Balanced control of waiting and travel time

Services and advertising control

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Part 2: Delay Management

Chapter 5: Introduction

Application

Related Literature

A Model for the Delay Management Problem

Event-activity Networks in Delay Management

Chapter 6: Delay Management with Fixed Connections

Linear Programming Approach

Relation to the Critical Path Method

Relation to the Feasible Differential Problem

Chapter 7: Minimizing the Sum of All Delays

A Linear Model

Activity-based Model

Constant Weights and the Never-meet Property

A Simple Special Case

Solving the model with constant weights

Solving the Total Delay Management Problem

Chapter 8: The Bicriteria Delay Management Problem

A First Analysis

Integer Programming Formulation

Lexicographic and Supported Efficient Solutions

Finding All Efficient Solutions