



Data Analytics for IT Networks

Developing Innovative Use Cases

Data Analytics for IT Networks

Developing Innovative Use Cases

John Garrett CCIE Emeritus No. 6204, MSPA

Cisco Press

Data Analytics for IT Networks: Developing Innovative Use Cases

Table of Contents

Cover

Title Page

Copyright Page

Dedication

Contents

Foreword

Introduction: Your future is in your hands!

Chapter 1 Getting Started with Analytics

What This Chapter Covers

Data: You as the SME

Use-Case Development with Bias and Mental Models

Data Science: Algorithms and Their Purposes

What This Book Does Not Cover

Building a Big Data Architecture

Microservices Architectures and Open Source Software

R Versus Python Versus SAS Versus Stata

Databases and Data Storage

Cisco Products in Detail

Analytics and Literary Perspectives

Analytics Maturity

Knowledge Management

Gartner Analytics

Table of Contents

Strategic Thinking

Striving for Up and to the Right

Moving Your Perspective

Hot Topics in the Literature

Summary

Chapter 2 Approaches for Analytics and Data Science

Model Building and Model Deployment

Analytics Methodology and Approach

Common Approach Walkthrough

Distinction Between the Use Case and the Solution

Logical Models for Data Science and Data

Analytics as an Overlay

Analytics Infrastructure Model

Summary

Chapter 3 Understanding Networking Data Sources

Planes of Operation on IT Networks

Review of the Planes

Data and the Planes of Operation

Planes Data Examples

A Wider Rabbit Hole

A Deeper Rabbit Hole

Summary

Chapter 4 Accessing Data from Network Components

Methods of Networking Data Access

Pull Data Availability

Push Data Availability

Control Plane Data

Data Plane Traffic Capture

Table of Contents

Packet Data

Other Data Access Methods

Data Types and Measurement Considerations

Numbers and Text

Data Structure

Data Manipulation

Other Data Considerations

External Data for Context

Data Transport Methods

Transport Considerations for Network Data Sources

Summary

Chapter 5 Mental Models and Cognitive Bias

Changing How You Think

Domain Expertise, Mental Models, and Intuition

Mental Models

Daniel Kahnemans System 1 and System 2

Intuition

Opening Your Mind to Cognitive Bias

Changing Perspective, Using Bias for Good

Your Bias and Your Solutions

How You Think: Anchoring, Focalism, Narrative Fallacy, Framing, and Priming

How Others Think: Mirroring

What Just Happened? Availability, Recency, Correlation, Clustering, and Illusion of Truth

Enter the Boss: HIPPO and Authority Bias

What You Know: Confirmation, Expectation, Ambiguity, Context, and Frequency
Illusion

What You Dont Know: Base Rates, Small Numbers, Group Attribution, and
Survivorship

Your Skills and Expertise: Curse of Knowledge, Group Bias, and

Table of Contents

Dunning-Kruger

We Don't Need a New System: IKEA, Not Invented Here, Pro-Innovation,
Endowment, Status Quo, Sunk Cost, Zero Price, and Empathy

I Knew It Would Happen: Hindsight, Halo Effect, and Outcome Bias

Summary

Chapter 6 Innovative Thinking Techniques

Acting Like an Innovator and Mindfulness

Innovation Tips and Techniques

Developing Analytics for Your Company

Defocusing, Breaking Anchors, and Unpriming

Lean Thinking

Cognitive Trickery

Quick Innovation Wins

Summary

Chapter 7 Analytics Use Cases and the Intuition Behind Them

Analytics Definitions

How to Use the Information from This Chapter

Priming and Framing Effects

Analytics Rube Goldberg Machines

Popular Analytics Use Cases

Machine Learning and Statistics Use Cases

Common IT Analytics Use Cases

Broadly Applicable Use Cases

Some Final Notes on Use Cases

Summary

Chapter 8 Analytics Algorithms and the Intuition Behind Them

About the Algorithms

Algorithms and Assumptions

Table of Contents

Additional Background

Data and Statistics

Statistics

Correlation

Longitudinal Data

ANOVA

Probability

Bayes Theorem

Feature Selection

Data-Encoding Methods

Dimensionality Reduction

Unsupervised Learning

Clustering

Association Rules

Sequential Pattern Mining

Collaborative Filtering

Supervised Learning

Regression Analysis

Classification Algorithms

Decision Trees

Random Forest

Gradient Boosting Methods

Neural Networks

Support Vector Machines

Time Series Analysis

Text and Document Analysis

Natural Language Processing (NLP)

Information Retrieval

Topic Modeling

Table of Contents

Sentiment Analysis

Other Analytics Concepts

Artificial Intelligence

Confusion Matrix and Contingency Tables

Cumulative Gains and Lift

Simulation

Summary

Chapter 9 Building Analytics Use Cases

Designing Your Analytics Solutions

Using the Analytics Infrastructure Model

About the Upcoming Use Cases

The Data

The Data Science

The Code

Operationalizing Solutions as Use Cases

Understanding and Designing Workflows

Tips for Setting Up an Environment to Do Your Own Analysis

Summary

Chapter 10 Developing Real Use Cases: The Power of Statistics

Loading and Exploring Data

Base Rate Statistics for Platform Crashes

Base Rate Statistics for Software Crashes

ANOVA

Data Transformation

Tests for Normality

Examining Variance

Table of Contents

Statistical Anomaly Detection

Summary

Chapter 11 Developing Real Use Cases: Network Infrastructure

Analytics

Human DNA and Fingerprinting

Building Search Capability

Loading Data and Setting Up the Environment

Encoding Data for Algorithmic Use

Search Challenges and Solutions

Other Uses of Encoded Data

Dimensionality Reduction

Data Visualization

K-Means Clustering

Machine Learning Guided Troubleshooting

Summary

Chapter 12 Developing Real Use Cases: Control Plane

Analytics Using Syslog Telemetry

Data for This Chapter

OSPF Routing Protocols

Non-Machine Learning Log Analysis Using pandas

Noise Reduction

Finding the Hotspots

Machine LearningBased Log Evaluation

Data Visualization

Cleaning and Encoding Data

Clustering

More Data Visualization

Table of Contents

Transaction Analysis

Task List

Summary

Chapter 13 Developing Real Use Cases: Data Plane Analytics

The Data

SME Analysis

SME Port Clustering

Machine Learning: Creating Full Port Profiles

Machine Learning: Creating Source Port Profiles

Asset Discovery

Investigation Task List

Summary

Chapter 14 Cisco Analytics

Architecture and Advisory Services for Analytics

Stealthwatch

Digital Network Architecture (DNA)

AppDynamics

Tetration

Crosswork Automation

IoT Analytics

Analytics Platforms and Partnerships

Cisco Open Source Platform

Summary

Chapter 15 Book Summary

Analytics Introduction and Methodology

All About Networking Data

Table of Contents

Using Bias and Innovation to Discover Solutions

Analytics Use Cases and Algorithms

Building Real Analytics Use Cases

Cisco Services and Solutions

In Closing

Appendix A: Function for Parsing Packets from pcap Files

Index