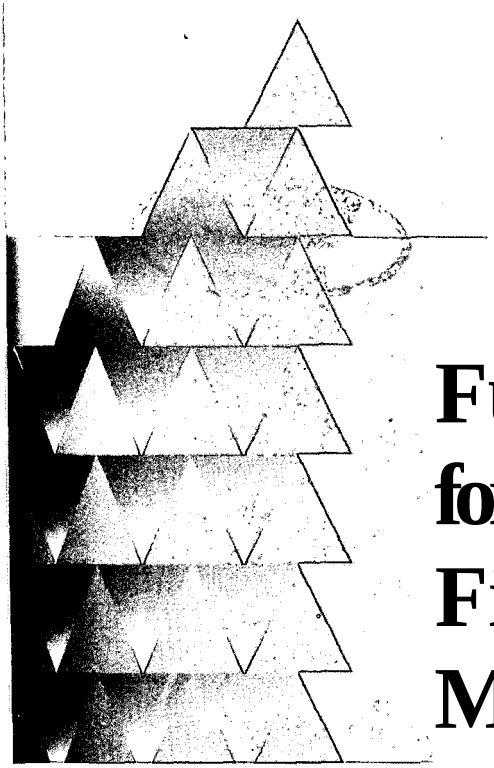
dandelon.com
© 2008 AGI-Information Management Consultants
May be used for personal purposes only or by
libraries associated to dandelon.com network.



Fuzzy Logic for Business, Finance, and Management

2nd Edition

/

George Bojadziev

Simon Fraser University, Canada

Maria Bojadziev

British Columbia Institute of Technology, Canada

World Scientific

NEW JERSEY • LONDON • SINGAPORE • BEIJING • SHANGHAI • HONG KONG • TAIPEI • CHENNAI

Contents

Foreword xi

Preface to the Second Edition xiii

Preface to the First Edition xv

List of Case Studies xix

1 Fuzzy Sets 1

1.1 Classical Sets: Relations and Functions 1
1.2 Definition of Fuzzy Sets 9
1.3 Basic Operations on Fuzzy Sets 15
1.4 Fuzzy Numbers 19
1.5 Triangular Fuzzy Numbers 22
1.6 Trapezoidal Fuzzy Numbers 24
1.7 Fuzzy Relations 26
1.8 Basic Operations on Fuzzy Relations 29
1.9 Notes 32

2 Fuzzy Logic 37

2.1 Basic Concepts of Classical Logic 37
2.2 Many-Valued Logic 41
2.3 What is Fuzzy Logic? 43
2.4 Linguistic Variables 44
2.5 Linguistic Modifiers 46
2.6 Composition Rules for Fuzzy Propositions 50
2.7 Semantic Entailment 54
2.8 Notes 56

Fuzzy Averaging for Forecasting , 61
3.1 Statistical Average . . . 61
3.2 Arithmetic Operations with Triangular and Trapezoidal Numbers . . . 62
3.3 Fuzzy Averaging . . . 66
3.4 Fuzzy Delphi Method for Forecasting . . . 71
3.5 Weighted Fuzzy Delphi Method . . . 76
3.6 Fuzzy PERT for Project Management . . . 77
3.7 Forecasting Demand . . . 87
3.8 Notes . . . 89

Decision Making in a Fuzzy Environment 91
4.1 Decision Making by Intersection of Fuzzy Goals and Constraints . . . 92
4.2 Various Applications . . . 95
4.3 Pricing Models for New Products . . . 104
4.4 Fuzzy Averaging for Decision Making . . . 110
4.5 Multi-Expert Decision Making . . . 115
4.6 Fuzzy Zero-Based Budgeting . . . 119
4.7 Notes . . . 125

Fuzzy Logic Control for Business, Finance, and Management 127
5.1 Introduction . . . 127
5.2 Modeling the Control Variables . . . 129
5.3 If ... and ... Then Rules . . . 133
5.4 Rule Evaluation . . . 136
5.5 Aggregation (Conflict Resolution) . . . 138
5.6 Defuzzification . . . 144
5.7 Use of Singletons to Model Outputs . . . 149
5.8 Tuning of Fuzzy Logic Control Models . . . 150
5.9 One-Input-One-Output Control Model . . . 152
5.10 Notes . . . 155

Applications of Fuzzy Logic Control 157
6.1 Investment Advisory Models . . . 157
6.2 Fuzzy Logic Control for Pest Management . . . 164

6.3 Inventory Control Models 170
6.4 Problem Analysis 177
6.5 Potential Problem Analysis 182
6.6 Notes 185

Fuzzy Queries from Databases: Applications 187
7.1 Standard Relational Databases 187
7.2 Fuzzy Queries 190
7.3 Fuzzy Complex Queries 196
7.4 Fuzzy Queries for Small Manufacturing Companies . . . 199
7.5 Fuzzy Queries for Stocks and Funds Databases 206
7.6 Notes 215

References 217

Index 223