

STUDIES IN FUZZINESS
AND SOFT COMPUTING

n Fuzziness and Soft Computing

Jonathan Lee
Editor

Software Engineering with Computational Intelligence



Springer

2-005-500-1

2-005-500-1

Foreword Jonathan Lee (Ed.)

Software Engineering with Computational Intelligence

Software Engineering and Computational Intelligence in a Systemic Approach
The book is a collection of papers presented at the International Conference on Software Engineering and Computational Intelligence (SECI) 2005, held in London, UK, in July 2005. The conference was organized by the British Computer Society (BCS) and the British Society for Artificial Intelligence (BSA). The book is divided into two parts: the first part contains papers on software engineering and the second part contains papers on computational intelligence. The book is a valuable resource for researchers and practitioners in the field of software engineering and computational intelligence.

The book is a collection of papers presented at the International Conference on Software Engineering and Computational Intelligence (SECI) 2005, held in London, UK, in July 2005. The conference was organized by the British Computer Society (BCS) and the British Society for Artificial Intelligence (BSA). The book is divided into two parts: the first part contains papers on software engineering and the second part contains papers on computational intelligence. The book is a valuable resource for researchers and practitioners in the field of software engineering and computational intelligence.

The book is a collection of papers presented at the International Conference on Software Engineering and Computational Intelligence (SECI) 2005, held in London, UK, in July 2005. The conference was organized by the British Computer Society (BCS) and the British Society for Artificial Intelligence (BSA). The book is divided into two parts: the first part contains papers on software engineering and the second part contains papers on computational intelligence. The book is a valuable resource for researchers and practitioners in the field of software engineering and computational intelligence.



Springer

Contents

1 Introduction to Software Engineering with Computational Intelligence	1
<i>Jonathan Lee</i>	
1.1 Introduction	1
1.2 Managing Imprecise and Conflicting Requirements	2
1.3 Coping with Fuzzy Objects and Imprecise Knowledge	2
1.4 Handling Uncertainty for Software Quality Prediction	4
1.5 Conclusion	6
References	6
2 Fuzzy Concepts and Formal Methods	9
<i>Chris Matthews, Paul A. Swatman</i>	
2.1 Introduction	9
2.2 Fuzzy Set Representation in Z	14
2.3 The Toolkit Summary	16
2.4 Some Illustrative Examples	28
2.5 Toolkit Usage — Reflections and Guidelines	39
2.6 Conclusion	45
References	46
3 Trade-off Requirement Engineering	51
<i>Jonathan Lee, Jong-Yih Kuo, Nien-Lin Hsueh, Yong-Yi Fanjiang</i>	
3.1 Introduction	51
3.2 Requirements Elicitation	52
3.3 Modeling Soft Requirements	56
3.4 Analyzing Soft Requirements	57
3.5 Related Work	66
3.6 Conclusion	69
References	69
4 A Generalized Object-Oriented Data Model Based on Level-2 Fuzzy Sets	73
<i>Guy de Tré, Rita de Caluwe, Jörg Verstraete, Axel Haliez</i>	
4.1 Introduction	73
4.2 Types and Type System	75
4.3 Generalized Types and Generalized Type System	86
4.4 Conclusions	105
References	106

5 Modelling Imperfect Spatial Information in a Fuzzy Object Oriented Database	109
<i>Gloria Bordogna, Sergio Chiesa</i>	
5.1 Introduction	109
5.2 Imperfect information in fuzzy databases	110
5.3 Representing Imperfect Spatial Information within fuzzy set and possibility theory	113
5.4 Representation of imperfect spatial information in a Fuzzy Object Oriented Database	118
5.5 Vague query constraints evaluation on imperfect spatial information	124
5.6 Conclusions	127
References	127
6 Using Classical Object-Oriented Features to build a FOODBS	131
<i>Fernando Berzal, Nicolás Marín, Olga Pons, María Amparo Vila</i>	
6.1 Introduction	131
6.2 Building a fuzzy database system over a classical one	133
6.3 Managing fuzzy capabilities using classical object oriented features	135
6.4 Some implementations issues	150
6.5 Conclusions and Further Work	152
References	153
7 Domain Analysis for the Engineering of Spatiotemporal Software	157
<i>Ali Dogru and Adnan Yazici</i>	
7.1 Introduction	157
7.2 Domain Analysis	158
7.3 Domain Model	161
7.4 Conclusions	169
References	169
8 Object-Oriented Framework of Fuzzy Knowledge Systems ..	171
<i>Mong-Fong Horng, Shih-Chu Lee and Yau-Hwang Kuo</i>	
8.1 Introduction	171
8.2 Fuzzy Linguistic Objects (FLOs)	172
8.3 Partial Inheritance Model	174
8.4 Reasoning in FLO-based Framework	176
8.5 Conclusions and Discussions	177
References	178
9 Fuzzy Evaluation of Domain Knowledge	183
<i>Bedir Tekinerdoğan and Mehmet Aksit</i>	
9.1 Introduction	183
9.2 Solution Domain Analysis	184
9.3 Problem Statement	186

9.4 Fuzzy knowledge Source Evaluator 187
 9.5 Case Study: Evaluating Transaction Domain Knowledge 190
 9.6 Related Work 198
 9.7 Conclusion 199
 9.8 Acknowledgements 200
 References 200

10 Application of Fuzzy Rule Extraction to Minimize the Costs of Misclassification on Software Quality Modeling 203

Zhuwei Xu, Taghi M. Khoshgoftaar

10.1 Introduction 203
 10.2 Fuzzy Classification 204
 10.3 Generating a fuzzy rule from numerical data 210
 10.4 Nonparametric Discriminant Analysis 215
 10.5 Case-Based Reasoning 216
 10.6 Network Communication System 218
 10.7 An Ada System 226
 10.8 A Very Large Window Application System 231
 10.9 Conclusions 239
 10.10 Acknowledgements 239
 References 240

11 Processing Software Engineering Data: Granular-based Approach 243

Marek Reformat, Witold Pedrycz

11.1 Introduction 243
 11.2 Granular Computing 245
 11.3 Evolutionary-based Synthesis of Granular Models 250
 11.4 Module Development Efforts 254
 11.5 Conclusions 266
 11.6 Acknowledgments 267
 References 267

Index 269

