

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 Hallez</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, Shiuh-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

Zhiwei 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