

Contents

Part I Preliminaries and Relevant Related Topics

1 The Internet of Things and Value Co-creation in a Service-Dominant Logic Perspective 3
Aurelio Tommasetti, Massimiliano Vesci, and Orlando Troisi

1.1 Introduction 3

1.2 Service-Dominant Logic: A Conceptual Framework of Analysis 4

1.3 The Relevance of the Internet of Things: A Review of Definitions and Main Concepts 5

1.3.1 The Internet of Things: Trends and Economic Value.... 10

1.4 From the Internet Revolution to the IoT Evolution 11

1.5 The Internet of Things and Value Co-creation: An Introduction in the Cultural Heritage Management..... 15

References..... 16

2 Pervasive Systems Architecture and the Main Related Technologies 19
Francesco Colace, Massimo De Santo, Vincenzo Moscato, Antonio Picariello, Fabio A. Schreiber, and Letizia Tanca

2.1 Introduction to Pervasive Data Management 19

2.2 Data Sources 21

2.2.1 Social Networks 22

2.2.2 Sensor Networks 23

2.2.3 Digital Repositories 23

2.2.4 Web Data Services 25

2.3 Advanced Data Management 25

2.3.1 Relational Technologies 26

2.3.2 NoSQL Databases 27

2.3.3 Real-Time Data Management 34

2.3.4 Main Memory Databases 35

2.4	Data Analytics	38
2.4.1	Data Mining	38
2.4.2	Other Common Data Analysis Methods	39
2.4.3	Making Sense of Big Data	40
	References	41
3	Privacy in Pervasive Systems: Social and Legal Aspects and Technical Solutions	43
	Sabrina De Capitani di Vimercati, Sara Foresti, Giovanni Livraga, Stefano Paraboschi, and Pierangela Samarati	
3.1	Introduction	43
3.2	Privacy in Pervasive Systems	45
3.2.1	Reference Scenario	45
3.2.2	Privacy Issues	48
3.3	Protecting Location Information	49
3.4	Privacy-Preserving Data Sharing	53
3.4.1	Protecting Macrodata	53
3.4.2	Protecting Microdata	55
3.4.3	Protecting Data Streams	59
3.5	Privacy-Preserving Data Storage	60
3.6	Conclusions	63
	References	63
 Part II Sensors, Data Streams, and Storage		
4	Sensors and Wireless Sensor Networks as Data Sources: Models and Languages	69
	Fabio A. Schreiber and Manuel Roveri	
4.1	Introduction	69
4.2	Sensors	70
4.3	WSN Units: Hardware and Software Description	76
4.3.1	Hardware Platforms	76
4.3.2	Operating Systems	79
4.4	Data Transmissions in WSNs	80
4.5	Querying a WSN	81
4.6	WSN Data Languages	85
4.6.1	TinyDB	85
4.6.2	GSN	86
4.6.3	DSN	86
4.6.4	PerLa	86
4.7	Summary	90
	References	90

5	Data Streams and Data Stream Management Systems and Languages	93
	Emanuele Panigati, Fabio A. Schreiber, and Carlo Zaniolo	
5.1	A Short Introduction to Information Flow Processing and Data Streams	93
5.2	Data Stream Definitions	94
5.3	Data Stream Structure and Constraints on Queries	97
5.4	Data Stream Query Languages and Data Stream Management Systems	98
5.4.1	StreaQuel and TelegraphCQ	99
5.4.2	XML-QL and NiagaraCQ	99
5.4.3	OpenCQ	100
5.4.4	Tribeca	100
5.4.5	CQL and Stream	101
5.4.6	GSQL and Gigascope	103
5.4.7	PerLa	104
5.5	The Stream Mill System	106
5.6	Summary and Conclusions	109
	References	109
6	The Complex Event Processing Paradigm	113
	Gianpaolo Cugola and Alessandro Margara	
6.1	Introduction	113
6.2	CEP Languages	114
6.2.1	Event Model	114
6.2.2	Processing Model	115
6.3	Processing Algorithms	117
6.3.1	Automata-Based Processing	117
6.3.2	Columns-Based Processing	120
6.3.3	Exploiting Parallel Hardware	121
6.3.4	Performance Analysis	124
6.4	Protocols for Distributed Event Detection	125
6.4.1	Distribution Strategies	126
6.4.2	A Concrete Example: Distribution Strategies for T-Rex	126
6.4.3	Performance Analysis	129
6.5	Advanced Topics	130
6.6	Conclusions	131
	References	132

7	Applying Semantic Interoperability Principles to Data Stream Management	135
	Daniele Dell’Aglio, Marco Balduini, and Emanuele Della Valle	
7.1	Introduction	135
7.2	RSP Models	138
7.2.1	The RDF Data Model	138
7.2.2	The RSP Data Model	139
7.2.3	RSP Query Model	143
7.3	RSP Implementations	150
7.3.1	C-SPARQL	151
7.3.2	CQELS	152
7.3.3	SPARQL _{stream}	152
7.3.4	INSTANS	153
7.3.5	ETALIS and EP-SPARQL	154
7.3.6	SLD	155
7.4	Case Study	156
7.5	Conclusions	164
	References	164
 Part III Social Networks as Information Sources		
8	Multimedia Social Networks for Cultural Heritage Applications: The GIVAS Project	169
	Vincenzo Moscato, Antonio Picariello, and V.S. Subrahmanian	
8.1	Introduction: Social Networks and Multimedia	169
8.2	GIVAS Project	172
8.2.1	The System at a Glance	172
8.2.2	GIVAS Architecture	173
8.2.3	Implementation Details	177
8.3	A Case Study	179
8.4	Conclusions	181
	References	182
9	Sentiment Detection in Social Networks Using Semantic Analysis: A Tool for Sentiment Analysis and Its Application in Cultural Heritage Realm	183
	Shi-Kuo Chang, Luca Greco, and Aniello De Santo	
9.1	Introduction	183
9.2	Extracting a Mixed Graph of Terms	185
9.3	Searching the Sentiment by the Use of the Mixed Graph of Terms	187
9.4	A Case Study for Cultural Heritage Applications	189
9.5	Conclusions	191
	References	192

10 Security and Privacy Issues in Social Networks	195
Sepideh Deliri and Massimiliano Albanese	
10.1 Introduction	195
10.2 Overview of Online Social Networks	196
10.3 Security and Privacy Threats	197
10.3.1 Social Engineering and Reverse Social Engineering Attacks	197
10.3.2 Identity Theft	198
10.3.3 Spamming Attacks	199
10.3.4 Malware Issues	199
10.3.5 Clickjacking, Likejacking, and Cursorjacking Attacks	199
10.3.6 Cross-Site Scripting	200
10.3.7 Cyberbullying	201
10.3.8 Internet Fraud	201
10.3.9 Data Mining and Inference Attacks	201
10.3.10 Sybil and Identity Clone Attacks	202
10.4 Available Countermeasures	202
10.4.1 Countermeasures Against Phishing Attacks	203
10.4.2 Countermeasure Against Sybil Attacks	204
10.4.3 Countermeasures Against Spamming	204
10.5 The Role of OSN Users	205
10.6 Legal and Regulatory Landscape	206
10.7 Conclusions	207
References	208

Part IV Context Awareness and Personalization

11 Data Personalization	213
Georgia Koutrika	
11.1 Introduction	213
11.2 Definition of Personalization	214
11.3 User Models and Profiles	215
11.3.1 User Knowledge	216
11.3.2 User Goals	217
11.3.3 User Preferences and Interests	219
11.4 Data Personalization Methods	221
11.4.1 Information Filtering	221
11.4.2 Recommender Systems	223
11.4.3 Personalized Search	228
11.5 Personalization Examples in Museums	230
References	232

12	Context Awareness in Pervasive Information Management	235
	Francesco Colace, Vincenzo Moscato, Elisa Quintarelli, Emanuele Rabosio, and Letizia Tanca	
12.1	Introduction	235
12.2	Existing Approaches to Context-Based Knowledge Access	236
12.2.1	Using Different Perspectives in Data Modeling	237
12.2.2	Partitioning Information Bases	238
12.2.3	Determining the Set of Relevant Services	238
12.2.4	Information Filtering	239
12.3	Context-Aware Knowledge Adaptation	240
12.4	Using Context to Deal with Data and Services	243
12.4.1	Context-Aware Definition of Relevant Areas in Databases	243
12.4.2	Services' Activation Driven by Context	245
12.5	Context Schema Evolution	249
12.6	Data Personalization Based on Contextual Preferences	250
12.6.1	Using Contextual Preferences to Filter Context-Aware Data	251
12.6.2	Mining Contextual Preferences	252
12.7	PerLa for Context	253
12.8	Conclusion	254
	References	255
13	Context Awareness in Mobile Systems	257
	Mohamed Sarwat, Jie Bao, Chi-Yin Chow, Justin Levandoski, Amr Magdy, and Mohamed F. Mokbel	
13.1	Overview of Context Awareness in Mobile Systems	257
13.2	Spatial Location as a Context	259
13.2.1	Location-Aware Social Networking	259
13.2.2	Location-Aware Microblogging	267
13.2.3	Location-Aware Recommender Systems	270
13.3	Overview of Context and Preference-Aware Systems	275
13.3.1	Context and Preference-Aware Database Operations	276
	References	283
Part V Multimedia Information Management		
14	Content-Based Multimedia Retrieval	291
	Flora Amato, Luca Greco, Fabio Persia, Silvestro Roberto Poccia, and Aniello De Santo	
14.1	Introduction	291
14.2	Content-Based Text Retrieval	292
14.2.1	Basic Crawling and Indexing Strategies	293
14.2.2	IR Models and Weighting Schemes	294

14.3	Content-Based Video and Image Retrieval.....	296
14.3.1	Content-Based Video Retrieval.....	297
14.3.2	Content-Based Image Retrieval.....	298
14.4	Content-Based Audio Retrieval.....	299
14.4.1	A Framework for Audio Retrieval Systems.....	300
14.4.2	Properties of Audio Signals.....	301
14.4.3	Audio Feature Extraction and Classification Researches.....	302
14.4.4	Applications and Tools for Content-Based Audio Retrieval.....	303
14.5	Further Application Domains for Content-Based Multimedia Retrieval.....	304
	References.....	305
15	Multimedia Queries in Digital Libraries.....	311
	Ilaria Bartolini and Marco Patella	
15.1	Peculiarities of Querying Multimedia Data.....	311
15.2	The Windsurf Model.....	313
15.2.1	Efficient Processing of Similarity Queries.....	315
15.2.2	Processing of Mixed Queries.....	316
15.3	Semantic Enrichment of Multimedia Data.....	318
15.3.1	Efficient Annotation of Complex Multimedia Documents.....	322
	References.....	324
16	Multimedia Recommendation and Delivery Strategies.....	327
	Ruggero G. Pensa, Antonio Penta, and Maria Luisa Sapino	
16.1	Introduction.....	327
16.2	Grouping of Related Objects and Users Through Co-clustering... ..	329
16.2.1	Factorization-Based Approaches.....	331
16.2.2	Information-Theoretic Approaches.....	332
16.2.3	Probabilistic Approaches.....	333
16.2.4	Association-Based Approaches.....	333
16.3	Delivery Strategies for Multimedia Recommendation.....	336
16.3.1	Context-Based Delivery Strategies.....	337
16.3.2	Location-Based Delivery Strategies.....	338
16.3.3	Delivery Strategies Based on Device Features.....	339
16.3.4	Profile-Based Delivery Strategies.....	339
16.4	Conclusion.....	340
	References.....	340

Part VI Application to the DATABENC Case Study

17 PATCH: A Portable Context-Aware ATlas for Browsing Cultural Heritage..... 345
Francesco Colace, Massimo De Santo, Vincenzo Moscato, Antonio Picariello, Fabio A. Schreiber, and Letizia Tanca

17.1 Introduction..... 345

17.2 Case Studies 347

17.3 System Overview..... 351

 17.3.1 Architecture 351

 17.3.2 Functionalities 352

17.4 Implementation Details 358

17.5 Conclusions and Future Work 359

References..... 360

Index..... 363

Data Management in Pervasive Systems

Colace, F.; De Santo, M.; Moscato, V.; Picariello, A.;
Schreiber, F.A.; Tanca, L. (Eds.)

2015, XXII, 366 p., Hardcover

ISBN: 978-3-319-20061-3