Preface

The aim of this book *Ontology Theory, Management and Design: Advanced Tools and Models which* is to gather the latest advances in various topics of ontologies and their applications.

Ontologies, as formal representations of knowledge, are currently widely in use in computer science research. So far they have mainly been used as support for modeling and managing large applications in several domains such as knowledge engineering, semantic web, information retrieval, database design, e-Business, data warehousing, data mining, etc.

The focus of this book is on Information and Communication Sciences, Computer Science, and Artificial Intelligence. The audience for this book is extensive and will include variety of audiences. In fact, this book will be of a great value to academic and professional organisations and will be instrumental in providing researchers, scientists, academics, postgraduate students, practitioners and professionals with access to the latest knowledge related to design, modeling and implementation of ontologies.

This book is organized in self-contained chapters to provide greatest reading flexibility. We have received 44 chapters from researchers of various disciplines (Artificial Intelligence, Knowledge Engineering, Information Systems) and from different countries. All submitted chapters have been reviewed on a double-blind review basis, by at least three reviewers. After an evaluation process by the PC members, 14 chapters have been selected. Acceptance was based on relevance, technical soundness, originality, and clarity of presentation. Chapters are divided into four parts:

- **Section 1:** Introduction and Overview: Theory, Concepts and Foundations
- **Section 2:** Theoretical Models and Aspects/ Formal Frameworks
- **Section 3:** Ontology Management: Construction, Evolution and Alignment
- **Section 4:** Ontology Applications and Experiences

This book is organised as follows.

The purpose of chapter 1: *Ontologies in Computer Science: These New "Software Components" of our Information Systems*, is an introduction to the branch of knowledge modeling that develops ontology-oriented computable models of some domain of knowledge.

Chapter 2: *Ontology Theory, Management and Design: An Overview and Future Directions*, reviews the main methodologies, tools and languages for building, updating and representing ontologies that have been reported in the literature.

Chapter 3: *Exceptions in Ontologies: A Theoretical Model for Deducing Properties from Topological Axioms*, is a contribution to the study of formal ontologies. It addresses the problem of atypical entities in ontologies and proposes a new model of knowledge representation by combining ontologies and topology.

Chapter 4: *An Algebra of Ontology Properties for Service Discovery and Composition in Semantic Web*, addresses the problem of the automated discovery and composition of Web Services. The authors present an algorithm that generates efficient orchestration plans, with characteristics of optimality regarding quality of service.

In Chapter 5: *Approaches for Semantic Association Mining and Hidden Entities Extraction in Knowledge Base*, an approach for the extraction of association rules from a structured semantic association store is proposed.

Chapter 6: *Reusing the Inter-Organizational Knowledge to Support Organizational Knowledge Management Process: An Ontology-Based Knowledge Network*, describes three main meditation methods used to reconcile mismatches between heterogeneous ontologies.

Chapter 7: *Building and Use of a LOM Ontology*, presents an approach to index learning resources semantically using a LOM ontology. A tool is also developed to allow describing and retrieving learning objects.

The purpose of Chapter 8: *Ontology Evolution: State of the Art and Future Directions*, is to gather research and current developments to manage ontology evolution. The authors highlight ontology evolution issues and present a state-of-the-art of ontology evolution approaches and tools.

In Chapter 9: *Large Scale Matching Issues and Advances*, the authors survey the techniques of large scale matching and compare existing schema matching tools.

Chapter 10: *From Temporal Databases to Ontology Versioning: An Approach for Ontology Evolution*, focuses in developing an ontology versioning system to express, apply and implement changes on the ontology. The proposed ontology versioning approach, based on three steps, aims to assist users in expressing evolution requirements, observing their consequences on the ontology and comparing ontology versions.

Chapter 11: *Ontology Learning from Thesauri: An Experience in the Urban Domain*, focuses on ontology learning techniques using thesauri as input sources. Apart from reviewing the state of the art, this chapter shows how ontology learning techniques can be applied in the urban domain for the development of domain ontologies.

In Chapter 12: *Applications of Ontologies and Text Mining in the Biomedical Domain*, the authors present the possible interactions between ontologies and text mining. The contents of this chapter are specially aimed to the state-of-the-art and the new opportunities that are arising from the combination of text mining and ontology-based technology.

The goal of Chapter 13: *Ontology Based Multimedia Indexing*, is to provide responses to the following question: how the ontologies could be used in order to index and manage the multimedia collections? This chapter also proposes a solution for indexing a multimedia collection by combining technologies from both semantic Web and Multimedia indexation domains.

Chapter 14: *Semantic Enrichment of Web Service Architecture*, presents a flexible architecture dedicated to services semantic integration, based on Web Services Modeling Ontology approach. The developed architecture is compared with some research works.

Faiez Gargouri
Wassim Jaziri
Editors