

1. Record Nr.	UNINA9910139141303321
Autore	Dao Tien Tuan
Titolo	Biomechanics of the musculoskeletal system : modeling of data uncertainty and knowledge // Tien Tuan Dao, Marie-Christine Ho Ba Tho
Pubbl/distr/stampa	London ; ; Hoboken, New Jersey : , : ISTE : , : Wiley, , 2014 ©2014
ISBN	1-118-93101-7 1-118-93099-1 1-118-93100-9
Descrizione fisica	1 online resource (167 p.)
Collana	Focus Series
Disciplina	612.7
Soggetti	Musculoskeletal system Musculoskeletal system - Mechanical properties
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Cover; Title Page; Copyright; Contents; Preface; CHAPTER 1. BIOMECHANICS OF THE MUSCULOSKELETAL SYSTEM; 1.1. Biomechanics and its applications; 1.1.1. Introduction; 1.1.2. Applications in biomechanics; 1.2. Biomechanics of the musculoskeletal system: current knowledge; 1.2.1. Introduction; 1.2.2. Rigid multi-body musculoskeletal modeling; 1.3. Challenges and perspectives of rigid multi-body musculoskeletal models; 1.4. Summary; 1.5. Bibliography; CHAPTER 2. MODELING OF BIOMECHANICAL DATA UNCERTAINTY; 2.1. Introduction of biomechanical data and their uncertainties; 2.1.1. Biomechanical data 2.1.2. Measuring chains of biomechanical data 2.1.3. Data uncertainty; 2.1.4. Biomechanical data uncertainty types and sources; 2.2. Biomechanical data uncertainty modeling; 2.2.1. Uncertainty representation; 2.2.2. Uncertainty modeling; 2.3. Biomechanical data uncertainty propagation; 2.3.1. Forward and backward uncertainty propagation; 2.3.2. Independent and dependent parameters; 2.3.3. Monte Carlo simulation; 2.3.4. Copula-based Monte Carlo simulation; 2.3.5. Example of uncertainty propagation through a physical law; 2.4.

Conclusions and perspectives; 2.5. Summary; 2.6. Bibliography  
CHAPTER 3. KNOWLEDGE MODELING IN BIOMECHANICS OF THE MUSCULOSKELETAL SYSTEM 3.1. Knowledge modeling in Biomechanics; 3.1.1. Introduction; 3.1.2. Clinical benefits; 3.2. Knowledge representation; 3.2.1. Web Ontology Language; 3.2.2. Production rule; 3.3. Knowledge reasoning; 3.3.1. Forward chaining; 3.3.2. Backward chaining; 3.4. Conventional and advanced knowledge discovery methods; 3.4.1. Knowledge discovery in databases; 3.4.2. Decision tree and belief decision tree; 3.4.3. Artificial neural network; 3.4.4. Support vector machine; 3.5. CDS system; 3.5.1. Expert system 3.5.2. Knowledge-based system 3.5.3. System of systems; 3.6. Conclusions; 3.7. Summary; 3.8. Bibliography; CHAPTER 4. CLINICAL APPLICATIONS OF BIOMECHANICAL AND KNOWLEDGE-BASED MODELS; 4.1. Patient-specific musculoskeletal model: effect of the orthosis; 4.1.1. Introduction; 4.1.2. Materials and methods; 4.1.3. Results; 4.1.4. Discussion; 4.2. Computational musculoskeletal ontological model; 4.2.1. Introduction; 4.2.2. Materials and methods; 4.2.3. Results; 4.2.4. Discussion; 4.3. Predictive models of the pathologies of the lower limbs; 4.3.1. Introduction; 4.3.2. Materials and methods 4.3.3. Results 4.3.4. Discussion; 4.4. Conclusions; 4.5. Summary; 4.6. Bibliography; CHAPTER 5. SOFTWARE AND TOOLS FOR KNOWLEDGE MODELING AND REASONING/INFERENCE; 5.1. Open source and commercial knowledge modeling software and tools; 5.1.1. Open source; 5.1.2. List of open source software and tools for knowledge modeling; 5.1.3. List of commercial software and tools for knowledge modeling; 5.2. Protege: ontology editor and knowledge-based framework; 5.2.1. Introduction; 5.2.2. Ontology development methodology; 5.2.3. Bio-ontology example; 5.3. JESS: reasoning and inference library 5.3.1. Introduction

---

## Sommario/riassunto

The topic of this book is the modeling of data uncertainty and knowledge for a health engineering problem such as the biomechanics of the musculoskeletal system. This is the first book on this subject. It begins with the state of the art in related topics such as data uncertainty, knowledge modeling, and the biomechanics of the musculoskeletal system, followed by fundamental and theoretical aspects of this field. Clinically relevant applications of musculoskeletal system modeling are then introduced. The book finishes with a chapter on practical software and tools for knowledge modeling and

---