



Ontologies in Medicine

Volume 102 Studies In Health Technology
and Informatics

Edited by: D.M. Pisanelli

2004, approx. 170 pp., hardcover

ISBN: 1 58603 418 9

Price: US\$90 / €114 / £60

It is now widely acknowledged that ontologies can make a significant contribution to the design and implementation of information systems in the medical field. The aim of this book is both to review fundamental theoretical issues in ontology and to demonstrate the practical effectiveness of the ontological approach by means of a series of case studies in specific problem areas. It begins with a discussion of the usefulness of ontology in solving problems in the field of medical terminology, including disambiguation of polysemous terms and organization of very large corpora. It goes on to consider the role played by ontologies in the integration and alignment of heterogeneous knowledge sources, in particular in the field of clinical guidelines and evidence-based medicine. Also included are discussions of basic issues of formal ontology, such as how to represent space, time and granularity in biomedical information systems, and discussions of specific high-level medical categories, such as organ systems and their functions. Other papers describe applications of ontology in the field of genomics and in the domain of organ transplantation, and also methods by which mistakes, cycles and inconsistencies in medical ontologies can be detected. The whole presents a unique survey of the most important contributions to the topic of formal ontology in medicine.

If Ontology is the Solution, What is the Problem?

Domenico M. Pisanelli and Aldo Gangemi

Biodynamic Ontology: Applying BFO in the Biomedical Domain

Pierre Grenon, Barry Smith and Louis Goldberg

Bodily Systems and the Spatial-Functional Structure of the Human Body

Barry Smith, Katherine Munn and Igor Papakin

Inflammation Ontology Design Pattern: an Exercise in Building a Core Biomedical Ontology with Descriptions and Situations

Aldo Gangemi, Carola Catenacci and Massimo Battaglia

Context-Based Task Ontologies for Clinical Guidelines

Anand Kumar, Paolo Ciccarese, Barry Smith and Matteo Piazza

An Ontological Framework for the Implementation of Clinical Guidelines in Health Care Organizations

Anand Kumar, Barry Smith, Domenico M. Pisanelli, Aldo Gangemi and Mario Stefanelli

Gene Ontology Application to Genomic Functional Annotation, Statistical Analysis and Knowledge Mining

Dario Martucci, Marco Masseroli and Francesco Pincioli

Evolving from Standard Vocabularies to Formal Ontology for an Information System Dedicated to Organ Transplantation

Anita Burgun, Christine Golbreich and Christian Jacquelinet

Mistakes in Medical Ontologies: Where Do They Come From and How Can They Be Detected?

Werner Ceusters, Barry Smith, Anand Kumar and Christoffel Dhaen

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