Manolis Koubarakis Timos Sellis et al. (Eds.)

Spatio-Temporal Databases

The CHOROCHRONOS Approach





Spatiotemporal Databases The Chorochronos Approach

Shashi Shekhar, Hui Xiong

Spatiotemporal Databases The Chorochronos Approach:

Spatio-Temporal Databases Manolis Koubarakis, 2003-08-04 This book is an introduction and source book for practitioners graduate s dents and researchers interested in the state of the art and practice in spatiot poral databases It collects the most important and representative research c ried out in the project CHOROCHRONOS and presents it in a uni ed fashion CHOROCHRONOS was a Training and Mobility Research Network funded by the European Commission with the objective to study the design implementation and application of spatiotemporal database management systems This book would never have been possible if it was not for the devoted work of many people First and foremost we would like to thank the authors of the nine chapters of this book for their hard work We would also like to acknowledge the help of Christiane Bernard our o cer from the European Commission who saw the project to its conclusion working as hard as we did to make it a thorough success The constructive comments and feedback of our reviewer Colette Roland University of Paris 1 are also very much appreciated Last but not least we would like to thank all the students and postdoctoral fellows who were trained during CHOROCHRONOS We hope the time they spent at CHOROCHRONOS node institutions was rewarding and lots of fun March 2003 Timos Sellis Manolis Koubarakis Andrew Frank Vienna St ephane Grumbach Ralf Hartmut Guting Christian Jensen Nikos Lorentzos Yannis Manolopoulos Enrico Nardelli Barbara Pernici Babis Theodoulidis Nectaria Tryfona Hans J org Schek Michel Scholl Table of Contents 1 Introduction **Spatio-Temporal Data Streams** Zdravko Galić, 2016-08-26 This SpringerBrief presents the fundamental concepts of a specialized class of data stream spatio temporal data streams and demonstrates their distributed processing using Big Data frameworks and platforms It explores a consistent framework which facilitates a thorough understanding of all different facets of the technology from basic definitions to state of the art techniques Key topics include spatio temporal continuous queries distributed stream processing SQL like language embedding and trajectory stream clustering Over the course of the book the reader will become familiar with spatio temporal data streams management and data flow processing which enables the analysis of huge volumes of location aware continuous data streams Applications range from mobile object tracking and real time intelligent transportation systems to traffic monitoring and complex event processing Spatio Temporal Data Streams is a valuable resource for researchers studying spatio temporal data streams and Big Data analytics as well as data engineers and data scientists solving data management and analytics problems associated with this class of data **Open Source Approaches in Spatial Data Handling Brent** Hall, Michael G. Leahy, 2008-09-27 The role open source geospatial software plays in data handling within the spatial information technology industry is the overarching theme of the book It also examines new tools and applications for those already using OS approaches to software development **Spatio-Temporal Database Management** Michael H. Böhlen, Christian S. Jensen, Michel O. Scholl, 2003-06-26 This book constitutes the refereed proceedings of the International Workshop on Spatio Temporal Database Management Systems STDBM 99 held in Edinburgh UK in September 1999 as a

satelite event of VLDB 99 The 13 revised full papers presented were carefully selected from 30 papers submitted The book offers topical sections on understanding and manipulating spatio temporal data integration exchange and visualization query processing index evaluation and constraints and dependencies Big Data Analytics and Knowledge Discovery Sanjay Madria, Takahiro Hara, 2016-08-05 This book constitutes the refereed proceedings of the 18th International Conference on Data Warehousing and Knowledge Discovery DaWaK 2016 held in Porto Portugal September 2016 The 25 revised full papers presented were carefully reviewed and selected from 73 submissions. The papers are organized in topical sections on Mining Big Data Applications of Big Data Mining Big Data Indexing and Searching Big Data Learning and Security Graph Databases and Data Warehousing Data Intelligence and Technology Geographic Uncertainty in Environmental Security Ashlev Morris, Svitlana Kokhan, 2007-09-14 On June 28 through July 1 2006 a NATO advanced research workshop was held in Kyiv Ukraine This meeting of scholars from both NATO and NATO partner countries brought together the leading researchers in the field of Fuzziness and Uncertainty in GIS for Environmental Security and Protection The papers based upon the presentations at this meeting are included in this book They were all quite good some focusing on the use of fuzzy sets in geography others focusing on explicit environmental concerns in Ukraine What this book cannot show is the camaraderie and spirit of cooperation that permeated the atmosphere of this workshop These researchers many of whom had never met before are now colleagues and are continuing to collaborate on research to this day and probably beyond Scholars from various positions and countries have chosen to work together in the spirit of cooperation to make the ideas presented in this book come to fruition At press time we do not know if Ukraine will become a NATO member or not In any case the editors wish to thank the NATO Science Committee for their funding encouragement and work in making this workshop a reality We hope that the spirit of cooperation and intellectual curiosity that was so lively at the conference will encourage the reader in the perusal of this work Spatiotemporal Data Analytics and Modeling John A, Satheesh Abimannan, El-Sayed M. El-Alfy, Yue-Shan Chang, 2024-04-15 With the growing advances in technology and transformation to digital services the world is becoming more connected and more complex Huge heterogeneous data are generated at rapid speed from various types of sensors Augmented with artificial intelligence and machine learning and internet of things latent relations and new insights can be captured helping in optimizing plans and resource utilization improving infrastructure and enhancing quality of services A spatial data management system is a way to take care of data that has something to do with space This could include data such as maps satellite images and GPS data A temporal data management system is a system designed to manage data that has a temporal component This could include data such as weather data financial data and social media data Some advanced techniques used in spatial and temporal data management systems include geospatial indexing for efficient querying and retrieval of location based data time series analysis for understanding and predicting temporal patterns in datasets like weather or financial trends machine learning algorithms for uncovering hidden patterns and

correlations in large and complex datasets and integration with Internet of Things IoT technologies for real time data collection and analysis These techniques augmented with artificial intelligence enable the extraction of latent relations and insights thereby optimizing plans improving infrastructure and enhancing the quality of services This book provides essential technical knowledge best practices and case studies on the state of the art techniques of artificial intelligence and machine learning for spatiotemporal data analysis and modeling The book is composed of several chapters written by experts in their fields and focusing on several applications including recommendation systems big data analytics supply chains and e commerce energy consumption and demand forecasting and traffic and environmental monitoring It can be used as academic reference at graduate level or by professionals in science and engineering related fields such as data science and engineering big data analytics and mining artificial intelligence machine learning and deep learning cloud computing and internet of Guide to Maritime Informatics Alexander Artikis, Dimitris Zissis, 2021-02-08 In the last 25 years information systems have had a disruptive effect on society and business Up until recently though the majority of passengers and goods were transported by sea in many ways similar to the way they were at the turn of the previous century Gradually advanced information technologies are being introduced in an attempt to make shipping safer greener more efficient and transparent The emerging field of Maritime Informatics studies the application of information technology and information systems to maritime transportation Maritime Informatics can be considered as both a field of study and domain of application As an application domain it is the outlet of innovations originating from data science and artificial intelligence as a field of study it is positioned between computer science and marine engineering This new field s complexity lies within this duality because it is faced with disciplinary barriers yet demands a systemic transdisciplinary approach At present there is a growing body of knowledge that remains undocumented in a single source or textbook designed to assist students and practitioners This highly useful textbook reference starts by introducing required knowledge algorithmic approaches and technical details before presenting real world applications The aim is to present interested audiences with an overview of the main technological innovations having a disruptive effect on the maritime industry as well as to discuss principal ideas methods of operation and applications and future developments The material in this unique volume provides requisite core knowledge for undergraduate or postgraduate students employing an analytical approach with numerous real world examples and case Mobility Data Management and Exploration Nikos Pelekis, Yannis Theodoridis, 2014-07-08 This text integrates studies different mobility data handling processes from database management to multi dimensional analysis and mining into a unified presentation driven by the spectrum of requirements raised by real world applications. It presents a step by step methodology to understand and exploit mobility data collecting and cleansing data storage in Moving Object Database MOD engines indexing processing analyzing and mining mobility data Emerging issues such as semantic and privacy aware querying and mining as well as distributed data processing are also covered Theoretical presentation is smoothly

interchanged with hands on exercises and case studies involving an actual MOD engine The authors are established experts who address both theoretical and practical dimensions of the field but also present valuable prototype software The background context clear explanations and sample exercises make this an ideal textbook for graduate students studying database management data mining and geographic information systems **Research Trends in Geographic Information** Science Gerhard Navratil, 2009-06-17 In June July 2008 the Institute for Geoinformation and Cartography at the Vienna University of Technology organized a scientific colloquium in this city where 15 well known scientists presented their ideas on research for the upcoming decade This book contains papers prepared by the participants as well as by other researchers The eighteen papers in this book reflect the opinion of a core group of Geoinformation scientists about future research topics Dealing with these topics poses multiple research questions for the coming years Handbook of Research on Innovations in Database Technologies and Applications: Current and Future Trends Ferraggine, Viviana E., Doorn, Jorge Horacio, Rivero, Laura C., 2009-02-28 This book provides a wide compendium of references to topics in the field of the databases systems and applications Provided by publisher Formal Ontology in Information Systems Antony Galton, Riichiro Mizoguchi, 2010 Ontology began life in ancient times as a fundamental part of philosophical enquiry concerned with the analysis and categorisation of what exists In recent years the subject has taken a practical turn with the advent of complex computerised information systems which are reliant on robust and coherent representations of their subject matter. The systematisation and elaboration of such representations and their associated reasoning techniques constitute the modern discipline of formal ontology which is now being applied to such diverse domains as artificial intelligence computational linguistics bioinformatics GIS knowledge engineering information retrieval and the Semantic Web Researchers in all these areas are becoming increasingly aware of the need for serious engagement with ontology understood as a general theory of the types of entities and relations making up their respective domains of enquiry to provide a solid foundation for their work The conference series Formal Ontology in Information Systems FOIS provides a meeting point for researchers from these and other disciplines with an interest in formal ontology where both theoretical issues and concrete applications can be explored in a spirit of genuine interdisciplinarity. This volume contains the proceedings of the sixth FOIS conference held in Toronto Canada during 11 14 May 2010 including invited talks by Francis Jeffry Pelletier John Bateman and Alan Rector and the 28 peer reviewed submissions selected for presentation at the conference ranging from foundational issues to more application oriented topics IOS Press is an international science technical and medical publisher of high quality books for academics scientists and professionals in all fields Some of the areas we publish in Biomedicine Oncology Artificial intelligence Databases and information systems Maritime engineering Nanotechnology Geoengineering All aspects of physics E governance E commerce The knowledge economy Urban studies Arms control Understanding and responding to terrorism Medical informatics Computer Sciences Foundations of Geographic Information Science Matt

Duckham, Michael F. Goodchild, Michael Worboys, 2003-01-30 As the use of geographical information systems develops apace a significant strand of research activity is being directed to the fundamental nature of geographic information This volume contains a collection of essays and discussions on this theme What is geographic information What fundamental principles Computing with Spatial Trajectories Yu Zheng, Xiaofang Zhou, 2011-10-02 Spatial are associated with it How can trajectories have been bringing the unprecedented wealth to a variety of research communities A spatial trajectory records the paths of a variety of moving objects such as people who log their travel routes with GPS trajectories. The field of moving objects related research has become extremely active within the last few years especially with all major database and data mining conferences and journals Computing with Spatial Trajectories introduces the algorithms technologies and systems used to process manage and understand existing spatial trajectories for different applications. This book also presents an overview on both fundamentals and the state of the art research inspired by spatial trajectory data as well as a special focus on trajectory pattern mining spatio temporal data mining and location based social networks Each chapter provides readers with a tutorial style introduction to one important aspect of location trajectory computing case studies and many valuable references to other relevant research work Computing with Spatial Trajectories is designed as a reference or secondary text book for advanced level students and researchers mainly focused on computer science and geography Professionals working on spatial trajectory computing will also find this book very useful Spatial Cognition VI. Learning, Reasoning, and Talking about Space Christian Freksa, Nora S. Newcombe, Peter Gärdenfors, Stefan Wölfl, 2008-09-10 This book constitutes the refereed proceedings of the International Conference on Spatial Cognition Spatial Cognition 2008 held in Freiburg Germany in September 2008 The 27 revised full papers presented together with 3 invited lectures were carefully reviewed and selected from 54 submissions. The papers are organized in topical sections on spatial orientation spatial navigation spatial learning maps and modalities spatial communication spatial language similarity and abstraction concepts and Mobility, Data Mining and Privacy Fosca reference frames as well as spatial modeling and spatial reasoning Giannotti, Dino Pedreschi, 2008-01-12 Mobile communications and ubiquitous computing generate large volumes of data Mining this data can produce useful knowledge yet individual privacy is at risk This book investigates the various scientific and technological issues of mobility data open problems and roadmap The editors manage a research project called GeoPKDD Geographic Privacy Aware Knowledge Discovery and Delivery and this book relates their findings in 13 chapters covering all related subjects Handbook of Research on Geographic Information Systems Applications and **Advancements** Faiz, Sami, Mahmoudi, Khaoula, 2016-10-21 The proper management of geographic data can provide assistance to a number of different sectors within society As such it is imperative to continue advancing research for spatial data analysis The Handbook of Research on Geographic Information Systems Applications and Advancements presents a thorough overview of the latest developments in effective management techniques for collecting processing analyzing and

utilizing geographical data and information Highlighting theoretical frameworks and relevant applications this book is an ideal reference source for researchers academics professionals and students actively involved in the field of geographic Temporal Information Systems in Medicine Carlo Combi, Elpida Keravnou-Papailiou, Yuval information systems Shahar, 2010-05-25 Temporal Information Systems in Medicine introduces the engineering of information systems for medically related problems and applications The chapters are organized into four parts fundamentals temporal reasoning maintenance in medicine time in clinical tasks and the display of time oriented clinical information. The chapters are self contained with pointers to other relevant chapters or sections in this book when necessary Time is of central importance and is a key component of the engineering process for information systems This book is designed as a secondary text or reference book for upper undergraduate level students and graduate level students concentrating on computer science biomedicine and engineering Industry professionals and researchers working in health care management information systems in medicine medical informatics database management and AI will also find this book a valuable asset **Database Technologies:** Concepts, Methodologies, Tools, and Applications Erickson, John, 2009-02-28 This reference expands the field of database technologies through four volumes of in depth advanced research articles from nearly 300 of the world's leading professionals Provided by publisher Encyclopedia of GIS Shashi Shekhar, Hui Xiong, 2007-12-12 The Encyclopedia of GIS provides a comprehensive and authoritative guide contributed by experts and peer reviewed for accuracy and alphabetically arranged for convenient access The entries explain key software and processes used by geographers and computational scientists Major overviews are provided for nearly 200 topics Geoinformatics Spatial Cognition and Location Based Services and more Shorter entries define specific terms and concepts The reference will be published as a print volume with abundant black and white art and simultaneously as an XML online reference with hyperlinked citations cross references four color art links to web based maps and other interactive features

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