

Lecture Notes in Artificial Intelligence 1404

Subseries of Lecture Notes in Computer Science

**Christian Freksa Christopher Habel
Karl F. Wender (Eds.)**

Spatial Cognition

**An Interdisciplinary Approach
to Representing and Processing
Spatial Knowledge**



Springer

Spatial Cognition An Interdisciplinary Approach To Representing And Processing Spatial Knowledge

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Spatial Cognition An Interdisciplinary Approach To Representing And Processing Spatial Knowledge:

Spatial Cognition Christian Freksa, Christopher Habel, Karl F. Wender, 2003-05-20 Research on spatial cognition is a rapidly evolving interdisciplinary enterprise for the study of spatial representations and cognitive spatial processes be they real or abstract human or machine Spatial cognition brings together a variety of search methodologies empirical investigations on human and animal orientation and navigation studies of communicating spatial knowledge using language and graphical or other pictorial means the development of formal models for representing and processing spatial knowledge and computer implementations to solve spatial problems to simulate human or animal orientation and navigation behavior or to reproduce spatial communication patterns These approaches can interact in interesting and useful ways Results from empirical studies call for formal explanations both of the underlying memory structures and of the processes operating upon them we can develop and implement operational computer models obeying the relationships between objects and events described by the formal models we can empirically test the computer models under a variety of conditions and we can compare the results to the results from the human or animal experiments A disagreement between these results can provide useful indications towards the refinement of the models

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Spatial Cognition V Thomas Barkowsky, Markus Knauff, Gérard Ligozat, Daniel R. Montello, 2007-11-16 This book constitutes the refereed proceedings of the International Conference on Spatial Cognition Spatial Cognition 2006 It covers spatial reasoning human robot interaction visuo spatial reasoning and spatial dynamics spatial concepts human memory mental reasoning and assistance spatial concepts human memory and mental reasoning navigation wayfinding and route instructions as well as linguistic and social issues in spatial knowledge processing

Space and Spatial Cognition Michel Denis, 2017-11-13 All living creatures inscribe their activity in space Human beings acquire knowledge of this space by traversing it listening to verbal descriptions and

looking at maps atlases and digital media We memorize routes compare distances mentally and retrieve our starting place after a long journey Space and Spatial Cognition provides an up to date introduction to the elements of human navigation and the mental representation of our environment This book explores the mental capacities which enable us to create shortcuts imagine new pathways and thus demonstrate our adaptation to the environment Using a multidisciplinary approach which draws on psychology neuroscience geography architecture and the visual arts the author presents answers to a number of questions Which mental capacities do people mobilize when confronted with space Which brain functions do they implement How do digital technologies extend these capacities By presenting space at the crossroads of a number of disciplines this volume reveals how each of them enhances our understanding of human behaviour in space Space and Spatial Cognition provides a unique insight into all facets of spatial cognition including spatial behaviour language and future technologies It will be the ideal companion for all students and researchers in the field

Spatial Cognition III Christian Freksa, Wilfried Brauer, Christopher Habel, Karl F. Wender, 2003-08-03 This third volume documents the results achieved within a priority program on spatial cognition funded by the German Science Foundation DFG The 23 revised full papers presented went through two rounds of reviewing and improvement and reflect the increased interdisciplinary cooperation in the area The papers are organized in topical sections on routes and navigation human memory and learning spatial representation and spatial reasoning

Spatial Cognition II Christian Freksa, Wilfried Brauer, Christopher Habel, Karl F. Wender, 2003-06-26 This book constitutes the second volume documenting the results achieved within a priority program on spatial cognition by the German Science Foundation DFG The 28 revised full papers presented were carefully reviewed and reflect the increased interdisciplinary cooperation in the area The book is divided into sections on maps and diagrams motion and spatial reference spatial relations and spatial inference navigation in real and virtual spaces and spatial memory

Spatial Cognition IV, Reasoning, Action, Interaction Christian Freksa, Markus Knauff, Bernd Krieg-Brückner, Bernhard Nebel, Thomas Barkowsky, 2005-02-22 This is the fourth volume in a series of books dedicated to basic research in spatial cognition Spatial cognition is a field that investigates the connection between the physical spatial world and the mental world Philosophers and researchers have posed various views concerning the relation between the physical and the mental worlds Plato considered pure concepts of thought as separate from their physical manifestations while Aristotle considered the physical and the mental realms as two aspects of the same substance Descartes a dualist discussed the interaction between body and soul through an interface organ and thus introduced a functional view that presented a challenge for the natural sciences and the humanities In modern psychology the relation between the physical and the cognitive space has been investigated using thorough experiments and in artificial intelligence we have seen views as diverse as problems can be solved on a representation of the world and a representation of the world is not necessary Today's spatial cognition work establishes a correspondence between the mental and the physical worlds by studying and exploiting their interaction it

investigates how mental space and spatial reality join together in understanding the world and in interacting with it The physical and representational aspects are equally important in this work Almost all topics of cognitive science manifest themselves in spatial cognition

Human Spatial Cognition and Experience Toru Ishikawa,2020-06-15 This book offers students an introduction to human spatial cognition and experience and is designed for graduate and advanced undergraduate students who are interested in the study of maps in the head and the psychology of space We live in space and space surrounds us We interact with space all the time consciously or unconsciously and make decisions and actions based on our perceptions of that space Have you ever wondered how some people navigate perfectly using maps in their heads while other people get lost even with a physical map What do you mean when you say you have a poor sense of direction How do we know where we are How do we use and represent information about space This book clarifies that our knowledge and feelings emerge as a consequence of our interactions with the surrounding space and show that the knowledge and feelings direct guide or limit our spatial behavior and experience Space matters or more specifically space we perceive matters Research into spatial cognition and experience asking fundamental questions about how and why space and spatiality matters to humans has thus attracted attention It is no coincidence that the 2014 Nobel Prize in Physiology or Medicine was awarded for research into a positioning system in the brain or inner GPS and that spatial information and technology are recognized as an important social infrastructure in recent years This is the first book aimed at graduate and advanced undergraduate students pursuing this fascinating area of research The content introduces the reader to the field of spatial cognition and experience with a series of chapters covering theoretical empirical and practical issues including cognitive maps spatial orientation spatial ability and thinking geospatial information navigation assistance and environmental aesthetics

Geographical Design Stephen C. Hirtle,2019-05-17 With spatial technologies ranging from mapping software to the use of location based services spatial knowledge is often acquired and communicated through geographic information technologies This book describes the interplay between spatial cognition research and use of spatial interfaces It begins by reviewing what is known about how humans process spatial concepts and then moves on to discuss how interfaces can be improved to take advantage of those capabilities by disambiguating cognitive aspects conceptual aspects computational aspects and communications aspects Special attention is given to a variety of innovative geographical platforms that provide users with an intuitive understanding and support the further acquisition of spatial knowledge Alternatives to shortest path algorithms to explore more scenic routes as well as individual user differences that can emerge from previous experiences with virtual spaces are also discussed The book concludes with a discussion of the number of outstanding issues including the changing nature of maps as the primary spatial interface concerns about privacy for spatial information and looks at the future of user centered spatial information systems

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 reference frames as well as spatial modeling and spatial reasoning

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