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Interactive Information Seeking, Behaviour and Retrieval. Edited by Ian Ruthven and Diane Kelly. London: Facet Publishing, 2011. 296 pp. $ 89.95 (paperback). (ISBN: 978-1-85604-707-4)

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Book Review

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This book is a must if one is a student or researcher new to information science and, in particular, to information retrieval (IR) interaction and multimedia research. It will be especially valuable to those interested in human factors of IR in a social search context combined with information representation, access and interaction techniques, interface and evaluation methodology issues, and Web-based or multimedia information behavior and retrieval interaction.

It is edited by two internationally known representatives of the established generation of researchers: Associate Professor Diane Kelly, University of North Carolina, Chapel Hill, and Professor Ian Ruthven, University of Strathclyde, Scotland. They have invited an international crowd of 17 fellow highly experienced senior and younger researchers from academia *and* the information industry to contribute to this textbook collection of 13 chapters on recent advances on information–interaction themes.[1]

In scope, the book is primarily oriented toward students and researchers of information science; but it indeed has relevance for, and bearing upon, computer science and, in particular, students of human–computer interaction who wish to be introduced to the umbrella of interactive IR themes. Such issues are scarcely dealt with in TREC and traditional IR contexts even though Web IR necessarily involves interaction. As a topic, information-interaction research is also increasingly important to the online Web search industry.

Clearly, information–interaction studies bridge laboratory-based IR and user-centered information (behavior) studies. It is fair to say that this book nicely supplements the Ingwersen and Järvelin (2005) research monograph on integration of information seeking and IR in context (2005) by adding interface, Web IR, social searching, and multimedia perspectives to the R&D agenda for systems design in a relevant and insightful way. Further, it connects indirectly to the two central biennial conferences, Information Seeking in Context (ISIC) and Information Interaction in Context (IIiX), where several of the authors frequently publish.

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[1]Throughout this review, I provide very brief biographical data about the young contributors who as yet may be unfamiliar to some readers.

The initial four chapters address human information behavior and seeking as well as task-based IR interaction, and how to carry out research on such issues. The following two chapters consider information representation or architecture in a broader sense: the system's organization of information contents and the four families of common retrieval models (Boolean, probabilistic, vector space, and language models, labeled *access models*). Chapter 7 concentrates on search system and user-centered evaluation and relates to the earlier methodological data collection and analysis chapter. The book then moves into the center of interaction with two chapters: interface issues and interactive techniques. The former provides an extensive overview of interface types for retrieval and how they may support searching. The latter chapter shows how one can support information interaction by providing helpful tools and by learning about individual searchers' interaction behavior. This serves as a kind of "personalization," which is continued in the ensuing chapter on Web IR, ranking methods, and personalization issues. Here, we are meeting the challenges of Web-based IR interaction, for which solutions require new lines of attack. This chapter goes well with the next, on "recommendation, collaboration and social search." This contribution considers the challenges to be met in research on social search behavior, and how knowledge of such behavior may support other searchers' seeking processes, as a kind of social personalization. The last two chapters concentrate on multimedia information interaction (i.e., user behavior, interfaces, interaction, and representation as well as access models in relation to nontextual data such as Flikr, YouTube, and similar multimedia providers such as online museums).

The foreword by Tefko Saracevic provides an intelligent and interesting perspective on the history of studies of information, information behavior, information seeking, and IR interaction. This novel, wider context for events also includes quantitative studies of information behavior such as bibliometrics and webometrics.

The preface is remarkably short. In my opinion, the reader would appreciate a more extensive consideration, perhaps in the form of a more comprehensive introduction with respect to the *combination* and overlap of (the research on) information behavior, information seeking, IR interaction, *and* multimedia. Notwithstanding, Kelly and Ruthven introduce the motivation for the generation of the book, its structure, and the individual chapters in a stringent, purposeful, and on-point.

The initial chapter, "Interactive Information Retrieval: History and Background," is by Colleen Cool, Professor at Queens College of the City University of New York, and Nick Belkin, Rutgers University. In a way, this chapter serves as the introduction to the book, although it does not address multimedia issues. The analyses are highly relevant and well argued. I appreciated the references to the original online information era (mid-1970s–mid-1990s), which saw a great deal of interaction research as well as theoretical development. Of course, the findings were grounded in the user-segments, computer and network technology, and bibliographic/online public access catalog systems approaches of that period—nevertheless, they are relevant to present-day Web searching.

Chapter 2, "Information Behavior and Seeking," is by Professor Peiling Wang, University of Tennessee, Knoxville. The chapter begins with extensive coverage of models dealing with information behavior and information searching, ranging from task-based and everyday information seeking to uncertainty and emotional aspects. It then analyzes a variety of IR interaction models and approaches, from Belkin's ASK model through Ingwersen's cognitive model and Marchionini's process model to Xie's recent situational model of interaction. The chapter ends with an analysis of approaches to, and models of, relevance, assessments, and criteria (e.g., the Vakkari and Hakala model). This succinct modus operandi nicely links models to relevant empirical evidence, according to their function.

Elaine Toms, Professor at Sheffield University, United Kingdom (formerly at Dalhousie University, Canada), discusses "Task-Based Information Searching and Retrieval" in chapter 3. During recent decades, work and search tasks have become the foci for research because they are seen as the triggers of information need, request, and hence, query. The task forms part of the situational context of the retrieval event. The chapter is highly recommended for its exposition of the anatomy and differences between work and search task, the variety of classifications of tasks applied to IR, and the (historic) relationships between task as vehicle and object for research. Toms succeeds in combining a concise review of useful empirical and theoretical research with genuine, new scientific insight into the matter.

The fourth chapter, "Approaches to Investigating Information Interaction and Behavior," by Professor Raya Fidel, University of Washington, Seattle, deals with retrieval and seeking interaction. It initially concentrates briefly on epistemological stance, research setting, level of control, and nature of experimentation. Central strengths and weaknesses are outlined as to kinds of experiments and data-collection instruments, and the contribution ends with implications of information studies for research and systems design. The chapter is relatively brief and could have been more informative with respect to analyses of relevant research-design frameworks for empirical information studies.

The next section of the book deals with the systems side. The first chapter, "Information Representation," is by Assistant Professor Mark D. Smucker, University of Waterloo, Canada, who belongs to the young generation of IR researchers, and received his PhD from the University of Massachusetts, Amherst in 2008. Essentially, this chapter considers text representation as well as manual and automatic indexing approaches also in an historical sense: It exemplifies central processes such as tokenization, conflation and stemming, and term weights. Although fairly short, the explanations are well done didactically and will suit undergraduate students.

Edie Rasmussen, Professor at University of British Columbia, Canada, is responsible for chapter 6, "Access Models." Her contribution "goes under the hood" of the search vehicle into the retrieval engine itself. Rasmussen defines and discusses the four formal fundamental IR model families: Boolean logic models; the vector space model, including cosine formula; probabilistic models; and language models. Boolean logic also is discussed in relation to users' conceptions of it, and the other mathematically based models are nicely defined through worked examples. I liked in particular the clear and simplistic explanation for language model smoothing and relevance feedback. Students new to IR and information science would profit tremendously from this chapter.

Chapter 7, "Evaluation," is by Professor Kalervo Järvelin, Tampere University, Finland. The chapter is well structured in five subsections dealing with the evaluation landscape, test collection-based IR evaluation, user-centered evaluation, operational IR system evaluation, and trends and challenges. It provides both a clear understanding of the issues through well-put examples (e.g., in the metrics section) and a review of the current situation and challenges to IR evaluation. The data protocol and evaluation metrics to apply in user-oriented and operational system evaluations is a very well-presented section. The chapter makes a strong case and constitutes the central core of the book, complementing the "Access Model" chapter very well.

Chapter 8, "Interfaces for Information Retrieval," is by Lecturer Max Wilson, Swansea University, United Kingdom, who received his PhD in 2009 from the University of Southampton. It is a comprehensive analysis of search user interface (SUI) designs and development that includes an informative, but brief, history of SUI for IR. This section leads up to modern SUIs that are categorized according to input, control, and informational (output or presentation) features. Input features dealt with include the search box, query by example, or adding (social) metadata; the control category encompasses interactive query changes, correction, sorting, or filtering features. The informational SUIs are mainly about visualization of output and relevance in various ways, organized in 2D or 3D. The chapter is well illustrated with appropriate interface shots of sufficient resolution to allow for observation of crucial details. Not much research has been done globally on SUIs in IR recently; therefore I find this contribution highly relevant and stimulating.

The following chapter, "Interactive Techniques," is written by Senior Researcher Ryen White, of the Context, Learning and User Experience for Search (CLUES) group, Microsoft Research, Redmond, Washington. His PhD from Glasgow University, Scotland in 2004 received the British Computer Society's Distinguished Dissertation Award in the United Kingdom in 2005. This chapter connects easily to the previous SUI chapter by analyzing R&D that may support IR interaction. One major theme is relevance feedback (RF) techniques, divided into explicit and implicit RF. These are reviewed and considered in relation to support of query generation and interactive modification (expansion or enhancement). White also discusses support of decision making as a challenge beyond these traditional mechanisms.

Jaime Teevan and Susan Dumais are responsible for chapter 10, "Web Retrieval, Ranking and Personalization." Both are affiliated with Microsoft Research, Redmond, Washington, with Teevan serving as Senior Researcher and Dumais as Principal Researcher and Manager of CLUES. Teevan received her PhD from MIT in 2007. I believe it is a good idea to provide special treatment to the Web issues of IR owing to its difference from more traditional (text-based) IR. Link structure and the collaborative, network-based, and truly interactive nature of the Internet (and its subset, the Web, in particular) make it quite challenging from an information–interaction perspective. The authors take up this challenge of the standard IR techniques and approaches outlined in previous chapters that obviously have informed the design of Web search engines. Teevan and Dumais argue that the unique character of the Web and the diversity of its user population require specialized solutions. The authors provide a background for understanding the challenges and analyze briefly how people interact with Web results, leading to features of personalization. Evaluation issues of (interactive) Web IR are very briefly considered, as are issues to be met in the future of Web search. Dynamic personalization, social searching, and mobile retrieval are seen as crucial future issues of concern. The chapter is well written for students, but is too brief in my opinion. It may serve to highlight the potential for further exploration into the world of Web retrieval interaction.

The social component is continued in the next chapter, "Recommendation, Collaboration and Social Search," by David Nichols, Senior Lecturer at the University of Waikato, New Zealand and Michael Twidale, Professor at the University of Illinois at Urbana-Champaign. All three themes are fairly recent on the IR research agenda and are heavily connected to the interactive Web environment. This chapter begins with a concise history of information access with emphasis on social and cooperative interactions. Then the authors take the reader into the realm of recommendation (systems), social search, and interfaces to support collaboration between information seekers. The chapter concludes with considerations about how design of interactive information systems is influenced by social elements. Recommendation (systems) are exemplified by Amazon.com as a case study, and viewed from the perspectives of collaborative filtering as well as implicit and explicit rating. Interfaces for collaboration and issues of systems design are analyzed very briefly.

The last two chapters discuss "Multimedia: Behavior, Interfaces and Interaction and "Multimedia: Information Representation and Access." Chapter 12 is written by Haiming Liu, Suzanne Little, and Stefan Rüger; Suzanne Little, Evan Brown, and Stefan Rüger are responsible for chapter 13. Suzanne Little is Researcher at the Knowledge Media Institute of the Open University, United Kingdom, and received her PhD from the University of Queensland, Australia, in 2006. Haiming Liu is Lecturer at the University of Bedfordshire, United Kingdom, and received her PhD in 2010 from the Open University. Stefan Rüger is Professor at the Knowledge Media Institute of the Open University, and Evan Brown is a PhD student at the same location.

The two chapters form a kind of mini-booklet within the larger book by displaying the same structure mirrored in their titles. Initially, chapter 12 analyzes interaction models and interfaces that are applied to multimedia (MM) IR. This connects with Wang's chapter on information seeking and behavior and Wilson's interface chapter, albeit without any explicit links. Campbell's ostensive model for image retrieval is described, as are other factor-based and query-by-example search interfaces. Implicit as well as explicit RF is touched upon, indirectly relating to White's chapter. Information-seeking behavior in relation to MM is briefly introduced, including exploratory searching and information foraging theory.

The last chapter on MM information representation and access models divides MM document representations into metadata-driven, "piggy-back" text and automatic annotation, and content-based representation and retrieval. The piggy-back method refers to applying textual support (e.g., as context) to the MM object. The chapter gives relevant examples of feature-based representations using color, shape, audio, video, and so on. How to evaluate MM retrieval systems is not dealt with.

It is safe to say that the book displays many different perspectives on interface design and use in a great variety of IR contexts. Search interface issues pop up in almost all chapters. User-centered as well as search-system-related evaluation methodologies are well analyzed and discussed. However, evaluation of search user interfaces and multimedia retrieval systems do *not* form part of the book, neither in the relevant chapters on the topics nor in the evaluation chapter. A chapter or major section on usability measures would have strengthened the work.

The bibliography is comprehensive, and the index is well constructed, but—as with all indexes—the searcher must know the entry term in order to find something. A minor point thus concerns the table of contents. The

editors or publisher ought to have elaborated it more by displaying subsections of the chapters, to give an immediate idea and overview of what to expect/obtain from reading or using the book.

This book is definitely needed and provides a valuable introduction to central theoretical perspectives, models, and methodologies paired with experiments and field investigations from the core specialties involved in information interaction. In my opinion, the most instructive and informed chapters are those considering the historical background of information interaction; conceptual models of information behavior, seeking and interactive retrieval; task-based IR; formal access models; MM representation, interfaces and interaction techniques; and, foremost, the evaluation chapter.

References

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