

Gerhard Weiss (ed.): Multiagent Systems

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The new edition of Gerhard Weiss' book on multiagent systems is a serious textbook – at 848 pages (excluding the index) it covers all aspects of a broad and interdisciplinary field that is multiagent systems (MAS) – exactly as the editor promises in the preface. The book is comprised of 17 chapters written by various authors (31 in total). It starts with conceptual chapters on intelligent agents and agent societies, goes on to discussing different theoretical aspects of MAS such as communication (including negotiation and argumentation theory), coordination (social choice, cooperative game theory and trust) and cognitive abilities (learning, planning and constraint handling), and finally brings the reader to more technical areas of the field, such as engineering MAS (agent programming, specification, verification and agent-oriented software engineering), ending with fundamentals – logics and classical game theory. Each of the chapters, as mentioned before, is written by top-notch researchers in the respective fields. As you can easily see glancing at the table of contents, the scope of the presentation is indeed impressive, and it looks as if Gerhard Weiss' endeavour is the most comprehensive treatment of the field of MAS.

I found reading the book to be very pleasant – every chapter is written well, and as the editor explains in the beginning of the book, almost every chapter is meant

to be self-contained (though there are obvious dependencies between some, and they are made clear in the beginning of such chapters). In my opinion every chapter is thorough enough to provide a good overview of the state-of-the-art research of a given sub-field. Each chapter is well structured, presents the necessary background material, provides illustrative examples and, in more engineering-oriented chapters, implementations. Thorough bibliographies and pointers to other resources are provided as well.

The self-containment of chapters is, however, somewhat debatable, as is self-containment of any academic paper. As one would expect, the difficulty varies across chapters, and while some of them are perfectly accessible to people with some background in computer science, others require more mathematical background or simply more time to study them well. I found chapter 10 (Multiagent Learning) to be especially demanding, and I expect that if it was not for my background in logic, I would find chapter 16 (logics for multiagent systems) to be rather difficult as well. That is, however, an intrinsic property of inter-disciplinary fields such as multiagent systems, and I do not take it to be a limitation of the book itself.

Another small comment with respect to the chapters' content is the choice of topics. Gerhard Weiss mentions in the preface that only one chapter was left intact from the first edition, and that the rest of the book has been remodelled to accommodate the fact that certain areas of research became more, and others less important over the course of the last twelve years. I believe

this to be one of the most difficult aspects of constructing such a textbook – to achieve balance between what is a reference book that touches upon every single area of the field (and presents its state-of-the-art) and a textbook that is targeted at students. In my opinion perhaps certain chapters could have been omitted in case one wants “Multiagent Systems” to be more of the latter (do we really need a whole chapter on agent societies?), or perhaps more content should be added in case one wants it to be more of the former kind (the book devotes virtually no chapter to the philosophical side of some aspects of the research field, like epistemology or deliberation). However, I believe there are as many opinions on what exactly should be in a book on multiagent systems as many there are researchers in the field, and I find Gerhard Weiss’ book to strike great balance between engineering and theory, the technical and the conceptual, or its didactic and purely reference-oriented side.

“Multiagent systems” is a textbook intended, as the editor writes, for undergraduate, graduate and post-graduate students, teachers, researchers and professionals – in principle anyone who would like to become familiar with the field. I found the book to be a *perfect* companion for a PhD student – in fact I genuinely regret not encountering such a book earlier, since it would have made my PhD background studies much easier and more efficient. I expect it to be an equally (if not more) useful to teachers teaching various courses related to the field of multi-agent systems as well – it is well structured and contains a number of exercises with varying degree of difficulty¹ at the end of each chapter, and teachers can find slides prepared by authors of respective chapters at the book’s website.² However, the editor argues that the book is also suitable for undergraduate students, and that is perhaps a point I would argue against a little bit.

“Multiagent Systems” is a book that reminds me of a series of *handbooks* that were published a couple of years ago,³ – it provides a fantastic overview of state-of-the-art research. In contrast to those handbooks, Ger-

¹ As a matter of fact it seems that some exercises (those marked with difficulty level 4) could be worthy a PhD thesis of their own.

² <http://www.the-mas-book.info/>

³ E.g. the “Handbook of Modal Logic” (Blackburn, van Benthem and Wolter (eds.), Elsevier 2007) or the “Handbook of Philosophical Logic” (Gabbay and Guenther (eds.), Springer 2007).

hard Weiss’ book contains a lot of didactic material, too, but it seems unsuitable for any use in an undergraduate level course. I find the content of respective chapters to be too narrow and specific for undergraduate students, and if considered as optional reading for a course in, for example, artificial intelligence, I expect it would be easier to compile a short list of papers for interested students to read, or simply for teachers to prepare some introductory slides themselves. Also, considering Weiss’ book as an undergraduate textbook, practical matters must be taken into account, and given that the book retail price is around \$75 (or £45 in the UK), I would classify as rather expensive for an academic textbook. One should also keep in mind that at close to 900 pages the book is rather hefty. That is not to say that Weiss’ book is *completely* unsuitable for undergraduate teaching, but rather to point out that it is not its greatest strength.

Another issue with using “Multiagent Systems” as an undergraduate textbook or self-study is that the editor does not exactly provide any detailed teaching plans. The preface mentions that one could use the whole book to provide a two-semester course, or that selected chapters could be used for one-semester courses or as optional material for any artificial intelligence related courses. However, there are no specific teaching plans in the style of other textbooks, at least no in the style of “paths” one can take if going through the whole book is not possible.⁴ While this is fine for an experienced researcher familiar with the field, such plans would be very helpful for self-study.

Regardless of the critical comments above, I find “Multiagent Systems” to be an excellent textbook for an experienced researcher or an advanced student, as well as a great reference tool for anyone interested in the field. I also want to emphasize once again the enormous scope of the book – to the best of my knowledge there is no comparable book on the market – it is as comprehensive as a book on multiagent systems can get without becoming more than one book. Finally, given that it is such a new publication, there are certain topics (e.g. abstract argumentation theory) which no other textbooks cover yet. In conclusion, I highly recommend Gerhard Weiss’ book.

⁴ A practice known from many other computer science textbooks, such as “Modal Logic” by Blackburn, de Rijke and Venema (Cambridge University Press 2002).