

Multimedia Needs Text Books

It is very interesting to see the factors in the development of a technology or a field. Usually we focus on the core of the technology and expect that if we make progress in that area, then things will change. I find it interesting that even with a strong progress in core areas, a field (or a company or a product) may struggle due to the lack of some key elements in the infrastructure.

I recall that when I became Chairman of ACM SIG Multimedia, a few young people discussed with me about the field of multimedia. The feeling was that Multimedia as a field does not get the respect it deserves. In most departments in the country, there are no required courses on Multimedia and when people try to hire faculty members, Multimedia is not listed as a field. Similarly, more researchers consider themselves working mainly in some other field and consider Multimedia as their secondary field. Most of these points were and are fairly accurate.

Multimedia is like the proverbial fable of the Elephant and the six blind men. Everybody in computing research and education looks at multimedia from their limited perspective. A good example of this is that IEEE Transactions on Multimedia is sponsored by Circuits, Signals, Communications, and Computer societies of IEEE! This clearly shows the interest from all these diverse research and academic areas in multimedia. Their perspectives, however, are so different that the field becomes a strange animal.

Computing is becoming multimedia. This is a similar situation as about 40-50 years ago there was about analog and digital computing. Slowly it was realized that digital computing easily subsumes analog and hence computing and digital computing became synonymous. Similarly, everything is becoming multimedia and the next generation will not use the term multimedia because computing will mean multimedia computing.

If this is what some people, including me, believe then why is that Multimedia is not getting the respect it deserves? There has to be some reasons and some solutions for this situation.

One problem became very clear to me this term when I started teaching multimedia. And this is a problem that could be solved by the community. But it will require commitment and efforts on the part of one or more people.

I am teaching a course on Multimedia Computing. I wanted to use a text book for this course but could not find a book that covers the topics the way I would like to see covered. Multimedia is an interesting area from technology perspective, particularly from technical education and research perspective. Multimedia is a synthesis of many different areas such as signal processing, signal understanding, communication theory, information theory, authoring systems, information retrieval, databases, visualization, human interfaces, networking, and operating systems. Most books in multimedia cover only some of these topics. In most cases, these books are written by active respected researchers in some area of Multimedia. These researchers either write the whole book

on the topics related to their expertise or try to cover other areas by touching them superficially.

My experience in academia has taught me that in any emerging field the early books are written by researchers for researchers. They focus on depth. And these books are good for advanced graduate students and other professors to find out details of particular techniques, concepts, or formulations. These books are inadequate for people who want to learn the field not do advanced research in the field. The interest may be because they want to be a practitioner in the field or they want to learn about the field to become a researcher later on. A reader may also be interested in knowing the field to understand what it covers, what are the basic principles, concepts, and techniques in the field that influence other areas. Some people may want to know how this field relates to other fields. Books written by researchers for researchers don't do justice to all these aspects.

A very important development that is required for an emerging area to mature is a text book that provides basic underpinnings of the field from a unified perspective and provides the foundations for the concepts and techniques in the field. Such a book is useful not only for new students, but is also equally useful for researchers in particular aspects of that field for them to get a holistic perspective of the field. Such holistic perspective helps them do more balanced research.

While thinking about the text book for multimedia, it is important to realize that in any emerging research area many books appear. I recall early days in computer vision research. Initially there was this book by Azriel Rosenfeld, which later came as Rosenfeld and Kak book. This book was written in the days when the emphasis was on images not on the information that could be obtained from images about the world. Hence these and other books in that era remained as image processing books. They did have some early foundations of computer vision but those were lost. These books were in 1970s.

The first book that made a significant impact on the field was Computer Vision by David Marr. This book really defined some of the basic research problems in the field and presented one researchers perspective and research. This book was very influential because its emphasis of the information recovery from images was the first time people saw this aspect clearly and could see why computer vision was not just image processing.

First textbooks in this field started appearing in 1990s. In fact I was personally involved in coauthoring a book with Kasturi and Schunck that was written not for researchers but for people who wanted to learn computer vision (though the name of the book was Machine Vision) and was not written for researchers. Now there are several books that have been authored to be text books. I am very pleased to see that they are truly written with students in mind.

What is interesting is that for almost the first two decades of Computer Vision, there was really no text book in this area. There were many books dealing with partial aspects and in quite some depth. There were some books that had broad coverage but the depth of

each chapter was at the research level. What is more important is that these chapters were written with a strong research bias of the authors. These books are important and do play a role in the maturity of the research in their field, but they are not text books that are essential for maturing of the complete area.

I am sure that similar things happened in other areas also. I recall that when I wanted to start dealing with image databases, the first thing I did was to find the text book used at my university in database courses and use that to educate myself. Before that I tried reading research papers, but could not get anywhere. I know that at one time there were a very few good textbooks in databases, but now there are many. No wonder databases are a respectable discipline at most universities now compared to about 2-3 decades ago.

Coming back to Multimedia, I do believe that Multimedia, more than any other field I can imagine, does need a strong text book. Multimedia field requires a book that is written for educating newcomers to the field and provides a unified perspective on the field. This book should not be a research book on one of the research field. It should not be an encyclopedia, either. An encyclopedia is good for reference not for learning a field.

In multimedia currently there is no such book. The only book that comes close is a new three volume set by Nahrstedt and Steinmetz. It is not easy to develop such a book. It required a very good understanding of the field and then significant thinking time and energy to put together such a book. I strongly feel that the maturation of Multimedia field requires development of such a book, or several books.