

Book review

Multimedia techniques for device and ambient intelligence: *A continuing endeavor*



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Abstract. The edited volume “Multimedia techniques for device and ambient intelligence” consists of two parts: i) an introduction to a variety of basic low level image processing techniques, leaving aside other modalities, and ii) work on high level, knowledge based processing, including interesting chapters on context aware computing and graph based pattern recognition. However, in the search for ambient multimedia techniques, the book can only partly redeem its promise.

Keywords: Ambient Intelligence (AmI), device intelligence, multimedia, low level processing, knowledge based

Multimedia Techniques for Device and Ambient Intelligence by E. Damiani and J. Jeong, New York, NY, USA: Springer Science + Business, LLC, 2009, ISBN: 978-0-387-88776-0.

“... when a field gets more mature there comes a time that frequently used notions should be formalized to make them susceptible of scrutiny.” [2] (p. 354)

1. Introduction

Although the quote above was made within the context of information retrieval (IR) [2], it also holds for Ambient Intelligence (AmI). AmI is gaining momentum and has to find its place among established fields such as artificial intelligence (AI) and computer vi-

sion [1,3]. This quest relies on the development of a generally accepted definition of AmI itself as well as of its core notions; for example, multimedia techniques.

In the preface of their edited volume, the editors state: “*Ambient Intelligence used to be a vision of our future. Today, it is more like a central aspect of our life: we already live surrounded by a new generation of electronic devices, helping us in most of our work and leisure endeavors.*” (p. v). Apparently, the reader should conclude: AmI is already here! However, whether or not this is true remains a topic of dispute, at least for now, as it is a matter of definition(s).

A claim of the editors that one can only support is: “... *the capability of extracting and processing multimedia information is crucial*” (p. v). The editors’ endeavor to provide an overview of multimedia techniques is relevant, not only for AmI but also beyond. This overview resulted in an edited volume consisting of two distinct parts: low level and high level, knowledge based processing. This is a distinction that is often made with multimedia techniques, but also in AI, IR [2], and computer vision [1,3], all relying on low level features while aiming at high level knowledge.

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2. Low level processing

In Part I, video coding and conversion, general low level image processing, and face recognition pass the revue. Although the relation between these techniques and AmI or ambient devices receives little emphasis, these issues are indeed relevant for AmI. For example, face recognition is, as usual, employed in controlled conditions. However, this starting point is not realistic when aiming for AmI. Consequently, the techniques as proposed in the book are of limited use to AmI. Moreover, there are already many excellent, established handbooks on computer vision; for example, [1,3]. This book will have to show its added value among them.

One could argue that multimedia is a term that has defied a proper definition. Computer vision techniques include the broadest range of distinct signals that can be processed and, consequently, is (indeed) the dominant modality in many multimedia applications. However, a minimal prerequisite is that multimedia should include at least multiple media or modalities.

For AmI, four modalities are of prime interest: i) visual (e.g., gesture/movement/object tracking, face recognition, and eye movements and blinks), ii) audio/acoustic (e.g., speech), iii) haptic/tactile, and iv) bio/physiological (e.g., electrodermal activity, electrocardiogram, and electroencephalogram) signals. In addition, although often ignored, multisensory processing and fusion could have been discussed, both from the machine's and from man's point of view.

3. High level, knowledge based processing

Although low level processing in uncontrolled conditions remains challenging, high level, knowledge based processing is possibly even more so. The biggest challenge, however, lies in between: How can low and high level processing be integrated? Although both multimedia processing and fusion techniques as well as cognitive (neuro)science are rapidly advancing, this remains a largely unsolved question.

Chapters 5 and 7 of Part II discuss virtual reality (VR): yet another young field of science, older than but closely related to AmI. The first of these chapters introduced the Wiimote as a human interface device for the interaction with 3D images. An interesting application; but, it hardly has anything to do with AmI. Similarly, in the other chapters, the AmI element seems to be enforced upon the work and the authors' core ex-

pertise seems to lay in a different area, as is illustrated by use of AI as abbreviation for ambient intelligence.

The authors of Chapters 6 and 8 aim to “bridge the gap between sensing and decision making” (p. 135): the so-called semantic gap. In Chapter 6, the authors provide a concise overview of literature on context-aware computing followed by the preliminaries and templates required for their framework. Subsequently, they briefly introduce four aggregation functions that are often used in the literature. After all building blocks have been presented, the results of some controlled, exploratory experiments are presented. Chapter 8 introduces graphical pattern recognition as a solution to the same problem, which is indeed an appealing idea. A short, non-technical, intuitive introduction is provided on this topic. This review has its value, in particular for those unfamiliar with this field.

4. Conclusion

The edited volume under review has its interesting elements. Its title, however, is somewhat misleading for two reasons. First, the book mainly discusses image/video processing techniques. However, in this field, the book has limited added value, when considering the excellent handbooks already available; for example, [1,3]. Second, only two chapters make a direct link to either ambient devices or AmI. These two chapters do, however, make up 25% of the book. Moreover, in both these chapters, a brave attempt is made to bridge the semantic gap. This has its value, as it is one of AmI's biggest challenges.

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