Preface

When the idea of writing a book came to my mind, originally the first idea was to focus on so-called semi-structured data, such as sequences, trees and graphs, which exactly I have been working on, more than other data types, and have more expertise. However once I started writing this book, I was getting more interested in covering the entire machine learning and data mining techniques, which are in fact connected to each other in many aspects. In particular, methods for semi-structured data sometimes can be similar to or the same as those for more basic data types. Also I became more interested in, simply speaking, writing a more introductory book, which can be read even by entry-level machine learners. This would be because writing this book made me remember my days I started working on machine learning and also machine learning itself just started its history. I thus tried writing a book comprehensible for even those who are working on other fields but have some interest in machine learning and/or data mining and also no stern background knowledge on them. As a result I might have focused more on what can be consistently used through different approaches and also different data types. In other words, many (differently regarded) approaches should have some common motivations and ideas behind them, even between those in different data types. These points are partially already known and written in papers, but not so much at the level of books, while they must be the things which make people understand machine learning approaches more clearly. Thus this book covers wide aspects of machine learning, shedding light on such aspects, which are shared by different methods. This would clarify how machine learning methods are similar to or different from each other.

This book is not only for researchers in the relevant fields but also a wide variety of people including students and engineers who are interested in artificial intelligence or more widely data science, regardless of their background. I hope that this book is helpful for a lot of readers to have some clearer picture of machine learning and data mining.

I started working on machine learning when I was working with a company, where at that time probably the most flexible place in Japan to start doing new research. The manager of the department I belonged was open-minded and had a great interest in artificial intelligence, thinking that the area is very promising in the future. I was in the "machine learning" group of the department, and people there, including me, were strongly encouraged by him to embark upon the new research area. I would like to thank him and people in the department for their

support of my doing machine learning research.

After I moved to academia, I have enjoyed more freedom to do research. That is, I could do research, simply following my own preference. The university system is rather bureaucratic as well as other organizations in Japan, while in the Institute for Chemical Research, Kyoto University, thanks to my colleagues and particularly warm arrangement of senior professors, I have been comfortably working in the institute. Without the atmosphere of respecting unique, original ways of thinking in the institute, I did not come to the idea of writing a book.

I started writing this book when I was staying at and working closely with the Department of Computer Science, Aalto University, Finland. I would like to thank all colleagues and people in the department. Aalto University welcomed me warmly and kindly, offering all I need to do research and other work. The system of the department, school, university and even country are all well organized, also always exploring efficiency and its improvement. I'd like to thank people who established and are maintaining those systems. This book was not realized without all efficient systems of the country.

In this book, part of the research the author has conducted with colleagues are introduced. Performing the collaborative research has not been done without the tremendous effort by the collaborators. Particularly in those work, a lot of missing parts of the author's ability were complemented by the excellent insights and capability of the collaborators. I deeply thank those collaborators I raise below alphabetically: Naoki Abe, Kiyoko Aoki-Kinoshita, David duVerle, Timothy Hancock, Kosuke Hashimoto, Minoru Kanehisa, Masayuki Karasuyama, Atsuyoshi Nakamura, Canh Hao Nguyen, Yasuko Ono, Motoki Shiga, Hiroyuki Sorimachi, Ichigaku Takigawa, Koji Tsuda, Keiko Udaka, Nobuhisa Ueda, Raymond Wan, Takashi Yoneya, Sohiya Yotsukura and Shanfeng Zhu.

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