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Introduction to Intelligent Surveillance

Surveillance Data Capture, Transmission, and Analytics

Third Edition

Springer

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Preface

Digital surveillance is a leading-edge security problem and has been unprecedentedly applied to monitor and protect our lives almost anywhere. It is ubiquitous and practical and could greatly lessen security staff's human labor. With the aid of intelligence, surveillance systems have the capability to automatically complete tasks such as object detection, recognition, tracking as well as event life cycle including event detection, recognition, search, retrieval, mining, reasoning, etc. With the development of artificial intelligence (AI), the systems have taken in from the progression of supercomputing, cloud computing, big data, deep learning, etc.

This book starts from camera calibration, along with surveillance data capturing, scrambling and descrambling, secure transmission with secure network environment; afterward, the surveillance at object level has been introduced such as detection, recognition, and tracking. Biometrics is presented as an important part of this book. A picture is more than a thousand of words, an event is more than thousands of pictures. An event is the basic unit of knowledge which bridges the gap between physical world and semantic objects; the life cycle of an event includes generating new ones and operations on events, etc. The knowledge based on events could be used for discovery and exploration, and this will be employed for surveillance alarm making; at the end of this book, fundamentals of supercomputing (FPGA, GPU, and parallel computing), cloud computing, mobile computing, deep learning, etc., will be emphasized.

This book is based on our research and teaching experience, we have used the content of this book for postgraduate teaching in the higher education. The stuff of the whole course including assignments and examinations has been verified for a plurality of times and could serve the readers of this book well.

This book was written for research students and engineers as well as scientists who are interested in intelligent surveillance.

Auckland, New Zealand — Wei Qi Yan
October 2018

Acknowledgements

The first edition of this book has been published in March 2016. In the past two years, we have endowed in all aspects to make the book full and perfect. Following the feedback from readers and audiences responses, the author has further omitted mistakes and typos, detailed the mathematical descriptions and algorithms, as well as updated each chapter with the latest contents and references.

The second edition of this book was published in June 2017 and emphasized on red-hot technology such as deep learning, mobile and cloud computing, and big data in intelligent surveillance. The author's endeavor was about how surveillance research and teaching could take in nutrition from the progress of other fields and what the audience and readers could pay their attention to when they read this book.

The third edition of this book is emphasized on human behavior analysis, privacy preservation, and the details of deep learning and artificial intelligence (AI). We integrate the latest development in AI and machine learning into this book for meeting the trends of today's research. The book shows how machine intelligence could assist security people in surveillance with regard to the fundamental aspects: observation, learning, presentation, and reasoning or references.

Thanks to our peer colleagues and students whose materials were referenced and who have given invaluable comments on this book. Special thanks to my supervised students: Dr. J. Weir, Dr. D. Kieran, Mr. Y. Jiao, Mr. G. Wang, Mr. W. Cui, Mr. D. Gu, Mr. J. Wang, Dr. Y. Zhang, Mr. L. Zhou, Mr. J. Lu, Mr. J. Shen, Mr. D. Shen, Mr. K. Zheng, Ms Y. Ren, Mr. R. Li, Mr. P. Li, Mr. Z. Liu, Ms. Y. Shen, Ms. H. Wang, Mr. C. Xin, Ms. Q. Zhang, Ms X. Zhang, Dr. Q. Gu, our colleagues: Dr. M. Nguyen, Prof. R. Klette, et al.

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