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Machine Learning for Robotics Applications

Springer

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Preface

Machine learning has become one of the most prevalent topics in recent years. The application of machine learning we see today is a tip of the iceberg. The machine learning revolution has just started to roll out. It is becoming an integral part of all modern electronic devices. Applications in automation areas like automotive, security and surveillance, augmented reality, smart home, retail automation and health care are few of them. Robotics is also rising to dominate the automated world. The future applications of machine learning in the robotics area are still undiscovered to the common readers. We are, therefore, putting an effort to write this edited book on the future applications of machine learning on robotics where several applications have been included in separate chapters. The content of the book is technical. It has been tried to cover all possible application areas of robotics using machine learning.

This book will provide the future vision on the unexplored areas of applications of robotics using machine learning. The ideas to be presented in this book are backed up by original research results. The chapter provided here in-depth look with all necessary theory and mathematical calculations. It will be perfect for laymen and developers as it will combine both advanced and introductory materials to form an argument for what machine learning could achieve in the future. It will provide a vision on future areas of application and their approach in detail. Therefore, this book will be immensely beneficial for the academicians, researchers and industry project managers to develop their new project and thereby beneficial for mankind.

Siena, Italy — Monica Bianchini
Melbourne, Australia — Milan Simic
Sarisha, India — Ankush Ghosh
Greater Noida, India — Rabindra Nath Shaw

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About the Editors

Monica Bianchini received the Laurea degree cum laude in Applied Mathematics in 1989 and the Ph.D. degree in Computer Science and Control Systems in 1995 from the University of Florence. She is currently an Associate Professor at the Department of Information Engineering and Mathematics of the University of Siena. Her main research interests are in the field of machine learning, with emphasis on neural networks for structured data and deep learning, approximation theory, bioinformatics, and image processing. M. Bianchini has authored more than one hundred papers and has been the editor of books and special issues on international journals in her research field. She has been involved in the organization of several scientific events, including the NATO Advanced Workshop on Limitations and Future Trends in Neural Computation (2001), the 8th AI*IA Conference (2002), GIRPR 2012, the 25th International Based Program Synthesis and Transformation, and the ACM International Conference on Computing Frontiers 2017. Prof. Bianchini served/serves as an Associate Editor for IEEE Transactions on Neural Networks (2003–2009), Neurocomputing (from 2003), and International Journal of Computers in Healthcare (from 2010). She is a permanent member of the Editorial Board of IJCNN, ICANN, ICPR, ICPRAM, ESANN, ANNPR and KES.−Symposium on Logic.

Milan Simic is a Senior Lecturer at RMIT University, School of Engineering, Melbourne, Australia and Visiting Professor at The University Nikola Tesla, Belgrade, Serbia. He is also an Associate Director for the Australia-India Research Centre for Automation Software Engineering (AIRCAUSE). AICAUSE is a joint initiative of RMIT University, State Government of Victoria and ABB Group (India and Australia). He completed his B.E., M.E. and Ph.D. from RMIT University Melbourne, Australia. He has published over 125 peer-reviewed publications, with 493 citations in the last 5 years. He has developed fast 3D metal printing technology, won an international award in Germany. For his contributions, Dr. Simic has also received other prestigious awards and recognitions: Two for the research and development from Honeywell and two RMIT University awards for excellence in teaching

and the provision of education to the community. As a KES Journal General Editor, Dr. Simic is processing around 400 papers per year, with the support of more than 70 Associate Editors and 600 reviewers. KES is a worldwide association involving about 5000 professionals, engineers, academics, students and managers.

Ankush Ghosh is Associate Professor in the School of Engineering and Applied Sciences, The Neotia University, India and Visiting Faculty at Jadavpur University, Kolkata, India. He has more than 15 years of experience in Teaching, research as well as industry. He has outstanding research experiences and published more than 60 research papers in International Journal and Conferences. He was a research fellow of the Advanced Technology Cell-DRDO, Government of India. He was awarded National Scholarship by HRD, Government of India. He received his Ph.D. (Engineering) Degree from Jadavpur University, Kolkata, India in 2010. His UG and PG teaching assignments include Microprocessor and microcontroller, AI, IOT, Embedded and real time systems etc. He has delivered Invited lecture in a number of international seminar/conferences, refreshers courses, and FDPs. He has guided a large number of M.Tech. and Ph.D. students. He is Editorial Board Member of seven International Journals.

Rabindra Nath Shaw is a Senior Member of IEEE (USA), currently holding the post of Director, International Relations, Galgotias University India. He is an alumnus of the applied physics department, University of Calcutta, India. He has more than eleven years teaching experience in leading institutes like Motilal Nehru National Institute of Technology Allahabad, India, Jadavpur University and others in UG and PG level. He has successfully organised more than 15 International Conferences as Conference Chair, Publication Chair and Editor. He has published more than fifty Scopus/WoS/ISI indexed research papers in International Journals and conference Proceedings. He is the editor of several Springer and Elsevier books. His primary area of research is optimization algorithms and machine learning techniques for power systems, IoT Application, Renewable Energy, and power Electronics converters. He also worked as University Examination Coordinator, University MOOC's Coordinator, University Conference Coordinator and Faculty In-Charge, Centre of Excellence for Power Engineering and Clean Energy Integration.

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