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# Computational Intelligence, Communications, and Business Analytics

Second International Conference, CICBA 2018  
Kalyani, India, July 27–28, 2018  
Revised Selected Papers, Part I

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# Foreword

Writing a foreword for the proceeding of an international conference, in the form of an edited volume, cannot but be an intellectual pleasure, which I can ill afford to desist from. But, I would like to avail the opportunity to write a few words for the foreword of the recently concluded Second International Conference on Computational Intelligence, Business Analytics, and Communication (CICBA-2018). The conference was organized by the Kalyani Government Engineering College in association with the Computer Society of India, during July 27–28, 2018, on the Kalyani Government Engineering College campus. The conference was technically co-sponsored by the CSI Kolkata Chapter, IEEE Kolkata chapter, IEEE Young Professionals, Kolkata, as well as the IEEE Computational Intelligence Society, Kolkata chapter. The proceeding of the conference are published by Springer in their CCIS series.

The conference included distinguished general chairs such as Prof. Carlos A. Coello Coello, Investigador Cinvestav, CINVESTAV-IPN, México, and Prof. Xin Yao, Southern University of Science and Technology (SUSTech), China. Prof. Kalyanmoy Deb, Michigan State University, USA, Prof. Hisaob Ishibuchi, Southern University of Science and Technology (SUSTech), China, Prof. Mike Hinchey, University of Limerick, Ireland, Prof. Ashok Deshpande, University of California, Berkeley, USA, were the keynote speakers, and there were luminaries from leading industries and research/academic institutes as invited speakers. The event could attain the true international standard that it intended to achieve.

There were 240 papers submitted from across the globe including countries like Australia, Bangladesh, Indonesia, Lithuania, Nigeria, Portugal, South Korea, USA, and Vietnam – out of which 76 papers were accepted and presented. Three special sessions of the conference were titled Computational Intelligence, Data Communications, and Data Mining and Advanced Data Analytics. The sub-tracks of the conference were Signal Processing, Computational Forensics (Privacy and Security), Microelectronics, Sensors, and Intelligent Networks.

Last but not the least, from my experience, I strongly believe that the conference was undoubtedly commendable, thanks to the organizers, who made it a grand success. CICBA 2019, which will be the third event in the CICBA series, will be organized by, and held at, Jadavpur University Kolkata during December 13–14, 2019, and I am sure that the event will be able to prove its standing as a successful series among the research community in the days ahead.

May 2019

Oscar Castillo

# Preface

Kalyani Government Engineering College, in collaboration with the Computer Society of India, organized the Second International Conference on Computational Intelligence, Communication, and Business Analytics (CICBA 2018), during July 27–28, 2018, on the Kalyani Government Engineering College Campus. This was the second activity of the Computer Society of India in an Eastern region with Springer as the publication partner. This conference was organized in technical collaboration with the Computer Society of India Kolkata Chapter, IEEE Kolkata section, IEEE Young Professionals, and IEEE CIS Kolkata. This mega event covered all aspects of computational intelligence, communications, and business analytics where the scope was not limited only to various engineering disciplines such as computer science, electronics, and biomedical engineering researchers but also included researchers from allied communities like data analytics and management science etc.

The volume is a collection of high-quality peer-reviewed research papers received from all over the world. CICBA 2018 attracted a good number of submissions from the different areas spanning over three tracks in various cutting-edge technologies of specialized focus, which were organized and chaired by eminent professors. These three special sessions were: Computational Intelligence, Data Communications, and Data Mining and Advanced Data Analytics. The sub-tracks of the conference were Signal Processing, Computational Forensics (Privacy and Security), Microelectronics, Sensors, and Intelligent Networks. Based on a rigorous peer-review process by the Technical Program Committee members along with external experts as reviewers (national as well as international), the best quality papers were identified for presentation and publication. The review process was extremely stringent with a minimum of three reviews for each submission and occasionally up to six reviews. Checking of similarities and overlaps was also done based on the international norms and standards. Submitted papers came from countries like Australia, Bangladesh, Indonesia, Lithuania, Nigeria, Portugal, South Korea, the USA, and Vietnam. Out of the submission pool of received papers, only 30% were accepted for these proceedings.

The Organizing Committee of CICBA 2018 was made up of strong international academic and industrial luminaries and the Technical Program Committee comprised more than 200 domain experts. The proceedings of the conference are published as one volume in *Communications in Computer and Information Science* (CCIS), Springer, indexed by ISI Proceedings, DBLP, Ulrich's, EI-Compendex, SCOPUS, Zentralblatt Math, MetaPress, Springerlink and will be available at <http://www.springer.com/series/7899>. We, in our capacity as volume editors, convey our sincere gratitude to Springer for providing the opportunity to publish the proceedings of CICBA 2018 in their CCIS series.

The conference included distinguished general chairs and speakers such as Prof. Carlos A. Coello Coello, Investigador Cinvestav 3F, CINVESTAV-IPN, México, Prof. Xin Yao, Southern University of Science and Technology (SUSTech), China, Prof. Kalyanmoy Deb, Michigan State University, USA, Prof. Hisaob Ishibuchi, Southern University of Science and Technology (SUSTech), China, Prof. Mike Hinchey, University of Limerick, Ireland, Prof. Ashok Deshpande, University of California, Berkeley, USA, Prof. Pabitra Mitra, IIT Kharagpur, India, and Prof. Atal Chaudhuri, Vice-Chancellor, Veer Surendra Sai University of Technology (VSSUT), Burla, Odisha, India.

The editors express their sincere gratitude to Prof. Kalyanmoy Deb, Michigan State University, and Prof. Mike Hinchey, University of Limerick, Ireland, for offering their time to provide valuable guidance and inspiration to overcome various difficulties in the process of organizing the conference. We would like to take this opportunity to extend our heartfelt thanks to the honorary chair of this conference, Prof. Sankar Kumar Ghosh, Vice-Chancellor, University of Kalyani, India, for his active involvement from the very beginning until the end of the conference; without his support, this conference could never have assumed such a successful shape. Sincerest thanks are due to Prof. Bijay Baran Pal, University of Kalyani, and Prof. P. K. Roy, APIIT, India, for their valuable suggestions regarding the editorial review process. We express our sincere thanks to Prof. Samiran Chattopadhyay, Jadavpur University, for supporting us as in an important role in the Springer award committee. The editors also thank the other members of the award committee of CICBA 2018 for their efforts in selecting the best papers from of pool so many formidable accepted submissions.

Special words of appreciation are due to the Kalyani Government Engineering College, for coming forward to host to the conference, which incidentally was the second in the series. It was indeed heartening to note the enthusiasm of all the faculty, staff, and students of Kalyani Government Engineering College who organized the conference in a professional manner. The involvement of faculty coordinators and student volunteers is particularly praiseworthy in this regard. The editors leave no stone unturned and we thank technical partners and sponsors for providing all the support and financial assistance.

It is needless to mention the role of the contributors. But for their active support and participation the question of organizing a conference is bound to fall through. The editors take this opportunity to thank the authors of all the papers submitted for their hard work, more so because all of them considered the conference as a viable platform to showcase some of their latest findings, not to mention their adherence to the deadlines and patience with the tedious review process. The quality of a refereed volume primarily depends on the expertise and dedication of the reviewers who volunteer with a smiling face. The editors are further indebted to the Technical Program Committee members and external reviewers who not only produced excellent reviews but also did these in short time frames, in spite of their very busy schedule. Because of their quality work, it has been possible to maintain the high academic standard of the proceedings.

The editors would like to thank the participants of the conference, who have considered the conference a befitting one in spite of all the hardships they had to undergo.

Last but not the least, the editors acknowledge all the volunteers for their tireless efforts in meeting the deadlines and arranging every minute detail meticulously to ensure that the conference achieved its goal, academic or otherwise. Happy Reading!

May 2019

J. K. Mandal  
Somnath Mukhopadhyay  
Paramartha Dutta  
Kousik Dasgupta



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