

# **Smart Innovation, Systems and Technologies**

Volume 266

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Suresh Chandra Satapathy · Peter Peer ·  
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Editors

# Intelligent Data Engineering and Analytics

Proceedings of the 9th International  
Conference on Frontiers in Intelligent  
Computing: Theory and Applications  
(FICTA 2021)

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# Preface

This book is a collection of high-quality peer-reviewed research papers presented at the 9th International Conference on Frontiers in Intelligent Computing: Theory and Applications (FICTA 2021) held at the National Institute of Technology, Mizoram, Aizawl, India, during June 25–26, 2021.

The idea of this conference series was conceived by few eminent professors and researchers from premier institutions of India. The first three editions of this conference: FICTA 2012, 2013, and 2014 were organized by Bhubaneswar Engineering College (BEC), Bhubaneswar, Odisha, India. The fourth edition FICTA 2015 was held at NIT, Durgapur, West Bengal, India. The fifth and sixth editions FICTA 2016 and FICTA 2017 were consecutively organized by KIIT University, Bhubaneswar, Odisha, India. FICTA 2018 was hosted by Duy Tan University, Da Nang City, Vietnam. The eighth edition FICTA 2020 was held at NIT, Karnataka, Surathkal, India. All past eight editions of the FICTA conference proceedings are published in Springer AISC Series. Presently, FICTA 2021 is the ninth edition of this conference series which aims to bring together researchers, scientists, engineers, and practitioners to exchange and share their theories, methodologies, new ideas, experiences, and applications in all areas of intelligent computing theories and applications to various engineering disciplines like computer science, electronics, electrical, mechanical, biomedical engineering, etc.

FICTA 2021 had received a good number of submissions from the different areas relating to computational intelligence, intelligent data engineering, data analytics, decision sciences, and associated applications in the arena of intelligent computing. These papers have undergone a rigorous peer-review process with the help of our technical program committee members (from the country as well as abroad). The review process has been very crucial with minimum two reviews each and in many cases 3–5 reviews along with due checks on similarity and content overlap as well. This conference witnessed more than 400+ submissions including the main track as well as special sessions. The conference featured five special sessions in various cutting-edge technologies of specialized focus which were organized and chaired by eminent professors. The total toll of papers included submissions received cross-country along with ten overseas countries. Out of this pool, only 108 papers were

given acceptance and segregated as two different volumes for publication under the proceedings. This volume consists of 54 papers from diverse areas of intelligent data engineering and analytics.

The conference featured many distinguished keynote addresses in different spheres of intelligent computing by eminent speakers like Dr. Jinshan Tang (Professor in College of Computing at Michigan Technological University) and Prof. Sukumar Nandi (Department of Computer Science and Engineering, Indian Institute of Technology Guwahati, Assam, India). Dr. Jinshan Tang's keynote lecture on "Automatic Segmentation of COVID-19 Infections from Medical Images with Deep Convolutional Neural Network" gives an idea on the recent research trends for segmenting COVID-19 infections in CT slices. The technique only requires scribble supervision, with uncertainty aware self-ensembling and transformation consistent techniques. Also Prof. Sukumar's talk on the use and challenges of federated learning received ample applause from the vast audience of delegates, budding researchers, faculty, and students.

We thank the advisory chairs and steering committees for rendering mentor support to the conference. An extreme note of gratitude to Dr. Ranjita Das (Head, Department of CSE, NIT Mizoram, Aizawl, India) and Dr. Anumoy Ghosh (Head, Department of ECE, NIT Mizoram, Aizawl, India) for providing valuable guidelines and being an inspiration in the entire process of organizing this conference. We would also like to thank Department of Computer Science and Engineering and Department of Electronics and Communication Engineering, NIT Mizoram, Aizawl, India, who jointly came forward and provided their support to organize the ninth edition of this conference series.

We take this opportunity to thank the authors of all submitted papers for their hard work, adherence to the deadlines, and patience with the review process. The quality of a refereed volume depends mainly on the expertise and dedication of the reviewers. We are indebted to the technical program committee members who not only produced excellent reviews but also did these in short time frames. We would also like to thank delegates, who have participated in the conference above all hardships.

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## About the Editors

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