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Model and Data Engineering

11th International Conference, MEDI 2022
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Proceedings

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Preface

The International Conference on Model and Data Engineering (MEDI) is a yearly conference that provides a platform for researchers and practitioners to present research advances on modeling and data management, including topics such as database theory, database systems technology, data models, advanced database applications, and data processing. MEDI is a well-established conference, founded by researchers from Euro-Mediterranean countries, which has been a starting point for numerous international scientific collaborations and projects, as well as research visits and exchanges by students and faculty members from various institutions. MEDI has been held in various countries over the years, including France, Morocco, Spain, Greece, Cyprus, Italy, France, Estonia, and Portugal.

This year is the 11th edition of MEDI, held during November 21–24, 2022, in Cairo, Egypt. A total of 65 submissions were received. Each submission was rigorously evaluated and received three to five single blind reviews from an international Program Committee consisting of researchers from 20 different countries. Based on the result of the evaluation, it was decided to accept 18 papers, which represents an acceptance rate of 27.6%, for full presentation at the conference and 12 papers for short presentation. The 18 full papers are published in this proceedings book, while short papers are published in a separate volume. The accepted papers are from authors in 11 countries and include topics such as database systems, data stream analysis, knowledge graphs, machine learning, model-driven engineering, image processing, diagnosis, natural language processing, optimization, and advanced applications such as the Internet of Things and healthcare.

At MEDI 2022, two well-renowned researchers were keynote speakers. Vincent S. Tseng from the National Yang Ming Chiao Tung University gave a talk entitled “Broad and Deep Learning of Heterogeneous Health Data for Medical AI: Opportunities and Challenges”. The second keynote talk was given by Athman Bouguettaya from the University of Sydney and was titled “A Service-based Approach to Drone Service Delivery in Skyway Networks”.

MEDI 2022 was held in hybrid mode (in person and online) due to the special circumstances related to the COVID-19 pandemic. The organizers would like to thank all authors who submitted research papers for evaluation at MEDI 2022, as well as all members of the Program Committee and external reviewers, who carefully evaluated all contributions. Moreover, we extend our special thanks to the Local Organizing Committee members who were a key reason for the success of this year’s edition. We also appreciated using the EasyChair conference management system for handling all tasks related to handling submission and the reviewing process.

October 2022

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Abstracts of Invited Talks

A Service-Based Approach to Drone Service Delivery in Skyway Networks

Athman Bouguettaya

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Abstract. We propose a novel *service framework* to effectively provision drone-based delivery services in a skyway network. This service framework provides a high-level service-oriented architecture and an abstraction to model the drone service from both *functional* and *non-functional* perspectives. We focus on *spatio-temporal* aspects as key parameters to query the drone services under a range of requirements, including drone capabilities, flight duration, and payloads. We propose to *reformulate* the problem of drone package delivery as finding an optimal composition of drone delivery services from a designated take-off station (e.g., a warehouse rooftop) to a landing station (e.g., a recipient's landing pad). We select and compose those drone services that provide the best quality of delivery service in terms of payload, time, and cost under a range of *intrinsic* and *extrinsic* environmental (i.e., context-aware) factors, such as battery life, range, wind conditions, drone formation, etc. This talk will overview the key challenges and propose solutions in the context of single drones and swarms of drones for service delivery.

Bio: Athman Bouguettaya is Professor and previous Head of School of Computer Science, at the University of Sydney, Australia. He was also previously Professor and Head of School of Computer Science and IT at RMIT University, Melbourne, Australia. He received his PhD in Computer Science from the University of Colorado at Boulder (USA) in 1992. He was previously Science Leader in Service Computing at the CSIRO ICT Centre (now DATA61), Canberra, Australia. Before that, he was a tenured faculty member and Program director in the Computer Science department at Virginia Polytechnic Institute and State University (commonly known as Virginia Tech) (USA). He is a founding member and past President of the Service Science Society, a non-profit organization that aims at forming a community of service scientists for the advancement of service science. He is or has been on the editorial boards of several journals including, the IEEE Transactions on Services Computing, IEEE Transactions on Knowledge and Data Engineering, ACM Transactions on Internet Technology, the International Journal on Next Generation Computing, VLDB Journal, Distributed and Parallel Databases Journal, and the International Journal of Cooperative Information Systems. He is also the Editor-in-Chief of the Springer-Verlag book series on Services Science. He served as a guest editor of a number of special issues including the special issue of the ACM Transactions on Internet Technology on Semantic Web services, a special issue the IEEE Transactions

on Services Computing on Service Query Models, and a special issue of IEEE Internet Computing on Database Technology on the Web. He was the General Chair of the IEEE ICWS for 2021 and 2022. He was also General Chair of ICSOC for 2020. He served as a Program Chair of the 2017 WISE Conference, the 2012 International Conference on Web and Information System Engineering, the 2009 and 2010 Australasian Database Conference, 2008 International Conference on Service Oriented Computing (ICSOC) and the IEEE RIDE Workshop on Web Services for E-Commerce and E-Government (RIDE-WS-ECEG'04). He also served on the IEEE Fellow Nomination Committee. He has published more than 300 books, book chapters, and articles in journals and conferences in the area of databases and service computing (e.g., the IEEE Transactions on Knowledge and Data Engineering, the ACM Transactions on the Web, WWW Journal, VLDB Journal, SIGMOD, ICDE, VLDB, and EDBT). He was the recipient of several federally competitive grants in Australia (e.g., ARC), the US (e.g., NSF, NIH), Qatar (NPRP), EU (FP7), and China (NSFC). He also won major industry grants from companies like HP and Sun Microsystems (now Oracle). He is a Fellow of the IEEE, Member of the Academia Europaea (Honoris Causa) (MAE) (HON), WISE Fellow, AAIA Fellow, and Distinguished Scientist of the ACM.

Broad and Deep Learning of Big Heterogeneous Health Data for Medical AI: Opportunities and Challenges

Vincent S. Tseng

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Abstract. In healthcare domains, large-scale heterogeneous types of data like medical images, vital signs, electronic health records (EHR), genome, etc., have been collected constantly, forming the valuable big health data. Broad and deep learning of these big heterogeneous biomedical data can enable innovative applications for Medical AI with rich research lines/challenges arisen. In this talk, I will introduce recent developments and ongoing projects on the topic of Medical AI, especially in intelligent diagnostic decision support and disease risk prediction by using various advanced data mining/deep learning techniques including image analysis(for medical images), multivariate time-series analysis(for vital signs like ECG/EEG), patterns mining (for EHR), text mining (for medical notes), sensory analysis (for sensory data like air quality) as well as fusion methods for integrated modelling. Some innovative applications on Medical AI with breakthrough results based on the developed techniques, as well as the underlying challenging issues and open opportunities, will be addressed too at the end.

Bio: Vincent S. Tseng is currently a Chair Professor at Department of Computer Science in National Yang Ming Chiao Tung University (NYCU). He served as the founding director for Institute of Data Science and Engineering in NYCU during 2017–2020, chair for IEEE CIS Tainan Chapter during 2013–2015, the president of Taiwanese Association for Artificial Intelligence during 2011–2012 and the director for Institute of Medical Informatics of National Cheng Kung University during 2008 and 2011. Dr. Tseng received his Ph.D. degree with major in computer science from National Chiao Tung University, Taiwan, in 1997. After that, he joined Computer Science Division of EECS Department in University of California at Berkeley as a postdoctoral research fellow during 1998–1999. He has published more than 400 research papers, which have been cited by more than 13,000 times with H-Index 60 by Google Scholar. He has been on the editorial board of a number of top journals including *IEEE Transactions on Knowledge and Data Engineering (TKDE)*, *IEEE Journal of Biomedical and Health Informatics (JBHI)*, *IEEE Computational Intelligence Magazine (CIM)*, *ACM Transactions on Knowledge Discovery from Data (TKDD)*, etc. He has also served as chairs/program committee members for a number of premier international conferences related to data mining/machine learning, and currently he is the Steering Committee Chair for *PAKDD*. Dr. Tseng has received a number of prestigious awards, including IICM Medal of Honor (2021), Outstanding

Research Award (2019 & 2015) by Ministry of Science and Technology Taiwan, 2018 Outstanding I.T. Elite Award, 2018 FutureTech Breakthrough Award, and 2014 K. T. Li Breakthrough Award. He is also a Fellow of IEEE and Distinguished Member of ACM.

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