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Intelligent Decision Technologies

Proceedings of the 13th KES-IDT 2021 Conference

Springer

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Preface

This volume contains the proceedings of the 13th International KES Conference on Intelligent Decision Technologies (KES-IDT 2021). The conference was held as a Virtual Conference, on June 14–16, 2021. The 13th edition of KES-IDT was a second conference held under restrictions in response to the COVID-19 pandemic.

KES-IDT is an international annual conference organized by KES International being a sub-series of the KES Conference series.

KES-IDT is an interdisciplinary conference with opportunities for the presentation of new research results and discussion about them under the common title "Intelligent Decision Technologies." The conference has been creating for years a platform for knowledge transfer and the generation of new ideas.

This edition, KES-IDT 2021, attracted a number of researchers and practitioners from all over the world. The papers have been allocated to the main track and eight special sessions. All received papers have been reviewed by 2–3 members of the International Program Committee and International Reviewer Board, and only the selected number of them has been presented during the conference and included in the KES-IDT 2021 proceedings.

We are very satisfied with the quality of the program and would like to thank the authors for choosing KES-IDT as the forum for the presentation of their work. Also, we gratefully acknowledge the hard work of the KES-IDT international program committee members and of the additional reviewers for taking the time to review the submitted papers and selecting the best among them for presentation at the conference and inclusion in its proceedings.

Despite the difficult time of the pandemic, we hope that KES-IDT 2021 significantly contributes to the fulfillment of academic excellence and leads to even greater successes of KES-IDT events in the future.

Gdynia, Poland — Ireneusz Czarnowski
Poole/Shoreham-by-Sea, UK — Robert J. Howlett
Shoreham-by-Sea, UK — Lakhmi C. Jain
June 2021

Contents

Main Track

ArgVote: Which Party Argues Like Me? Exploring an Argument-Based Voting Advice Application 3
Markus Brenneis and Martin Mauve

Detecting Communities in Organizational Social Network Based on E-mail Communication 15
Dariusz Barbucha and Paweł Szyman

Impact of the Time Window Length on the Ship Trajectory Reconstruction Based on AIS Data Clustering 25
Marta Mieczyńska and Ireneusz Czarnowski

Improved Genetic Algorithm for Electric Vehicle Charging Station Placement 37
Mohamed Wajdi Ouertani, Ghaith Manita, and Ouajdi Korbaa

Solving a Many-Objective Crop Rotation Problem with Evolutionary Algorithms 59
Christian von Lücken, Angel Acosta, and Norma Rojas

The Utility of Neural Model in Predicting Tax Avoidance Behavior 71
Coita Ioana-Florina and Codruţa Mare

Triple-Station System of Detecting Small Airborne Objects in Dense Urban Environment 83
Mikhail Sergeev, Anton Sentsov, Vadim Nenashev, and Evgeniy Grigoriev

Using Families of Extremal Quasi-Orthogonal Matrices in Communication Systems 95
Anton Vostrikov, Alexander Sergeev, and Yury Balonin

Variable Selection for Correlated High-Dimensional Data with Infrequent Categorical Variables: Based on Sparse Sample Regression and Anomaly Detection Technology 109
Yuhei Kotsuka and Sumika Arima

Verification of the Compromise Effect's Suitability Based on Product Features of Automobiles 127
Takumi Kato

Advances in Intelligent Data Processing and Its Applications

Application of Granular Computing-Based Pre-processing in the Labelling of Phonemes 141
Negin Ashrafi and Sheela Ramanna

Application of Implicit Grid-Characteristic Methods for Modeling Wave Processes in Linear Elastic Media 151
Evgeniy Pesnya, Anton A. Kozhemyachenko, and Alena V. Favorskaya

Combined Approach to Modeling of Acceleration Response Spectra in Areas of Active Shallow Seismicity 161
Vasiliy Mironov, Konstantin Simonov, Aleksandr Zotin, and Mikhail Kurako

Methods of Interpretation of CT Images with COVID-19 for the Formation of Feature Atlas and Assessment of Pathological Changes in the Lungs 173
Aleksandr Zotin, Anzhelika Kents, Konstantin Simonov, and Yousif Hamad

Multilevel Watermarking Scheme Based on Pseudo-barcoding for Handheld Mobile Devices 185
Margarita N. Favorskaya and Alexandr V. Proskurin

Multi-quasi-periodic Cylindrical and Circular Images 197
Victor R. Krasheninnikov, Yuliya E. Kuvayskova, and Alexey U. Subbotin

On the Importance of Capturing a Sufficient Diversity of Perspective for the Classification of Micro-PCBs 209
Adam Byerly, Tatiana Kalganova, and Anthony J. Grichnik

Robust Visual Vocabulary Based On Grid Clustering 221
Achref Ouni, Eric Royer, Marc Chevaldonné, and Michel Dhome

Study of Anisotropy of Seismic Response from Fractured Media 231
Alena Favorskaya and Vasily Golubev

Synchronization Correction Enforced by JPEG Compression in Image Watermarking Scheme for Handheld Mobile Devices 241
Margarita N. Favorskaya and Vladimir V. Buryachenko

Tracking of Objects in Video Sequences 253
Nikita Andriyanov, Vitaly Dementiev, and Dmitry Kondratiev

Multi-Criteria Decision-Analysis Methods—Theory and Their Applications

A New Approach to Identifying of the Optimal Preference Values in the MCDA Model: Cat Swarm Optimization Study Case 265
Jakub Więckowski, Andrii Shekhovtsov, and Jarosław Wątróbski

A Study of Different Distance Metrics in the TOPSIS Method 275
Bartłomiej Kizielewicz, Jakub Więckowski, and Jarosław Wątrobski

Assessment and Improvement of Intelligent Technology in Architectural Design Satisfactory Development Advantages Management 285
Vivien Yi-Chun Chen, Jerry Chao-Lee Lin, Zheng Wu, Hui-Pain Lien, Pei-Feng Yang, and Gwo-Hshiung Tzeng

IT Support for the Optimization of the Epoxidation of Unsaturated Compounds on the Example of the TOPSIS Method 297
Aleksandra Radomska-Zalas and Anna Fajdek-Bieda

Land Suitability Evaluation by Integrating Multi-criteria Decision-Making (MCDM), Geographic Information System (GIS) Method, and Augmented Reality-GIS 309
Hanhan Maulana and Hideaki Kanai

Toward Reliability in the MCDA Rankings: Comparison of Distance-Based Methods 321
Andrii Shekhovtsov, Jakub Więckowski, and Jarosław Wątróbski

Knowledge Engineering in Large-Scale Systems

Affection of Java Design Patterns to Cohesion Metrics 333
Sergey Zykov, Dmitry Alexandrov, Maqsudjon Ismoilov, Anton Savachenko, and Artem Kozlov

Applicative-Frame Model of Medical Knowledge Representation 343
Georgy S. Lebedev, Alexey Losev, Eduard Fartushniy, Sergey Zykov, Irina Fomina, and Herman Klimenko

Eolang: Toward a New Java-Based Object-Oriented Programming Language 355
Hadi Saleh, Sergey Zykov, and Alexander Legalov

Mission-Critical Goals Impact onto Process Efficiency: Case of Aeroflot Group 365
Alexander Gromoff, Sergey Zykov, and Yaroslav Gorchakov

High-Dimensional Data Analysis, Knowledge Processing and Applications

A Classification Method Based on Ensemble Learning of Deep Learning and Multidimensional Scaling 379
Kazuya Miyazawa and Mika Sato-Ilic

A Consistent Likelihood-Based Variable Selection Method in Normal Multivariate Linear Regression 391
Ryoya Oda and Hirokazu Yanagihara

A Hybrid Method of Multi-class SVM and Classification Method Based on Reliability Score for Autocoding of the Family Income and Expenditure Survey 403
Yukako Toko and Mika Sato-Ilic

Individual Difference Assessment Method Based on Cluster Scale Using a Data Reduction Method 415
Kazuki Nitta and Mika Sato-Ilic

Spatial Data Analysis and Sparse Estimation

Coordinate Descent Algorithm for Normal-Likelihood-Based Group Lasso in Multivariate Linear Regression 429
Hirokazu Yanagihara and Ryoya Oda

Discriminant Analysis via Smoothly Varying Regularization 441
Hisao Yoshida, Shuichi Kawano, and Yoshiyuki Ninomiya

Optimizations for Categorizations of Explanatory Variables in Linear Regression via Generalized Fused Lasso 457
Mineaki Ohishi, Kensuke Okamura, Yoshimichi Itoh, and Hirokazu Yanagihara

Robust Bayesian Changepoint Analysis in the Presence of Outliers 469
Shonosuke Sugasawa and Shintaro Hashimoto

Spatio-Temporal Adaptive Fused Lasso for Proportion Data 479
Mariko Yamamura, Mineaki Ohishi, and Hirokazu Yanagihara

Variable Fusion for Bayesian Linear Regression via Spike-and-slab Priors 491
Shengyi Wu, Kaito Shimamura, Kohei Yoshikawa, Kazuaki Murayama, and Shuichi Kawano

Intelligent Diagnosis and Monitoring of Systems: Methods, Tools, and Applications

Diagnosis of Active Systems with Abstract Observability 505
Gianfranco Lamperti, Marina Zanella, and Xiangfu Zhao

Java2CSP—A Model-Based Diagnosis Tool Not Only for Software Debugging 519
Franz Wotawa and Vlad Andrei Dumitru

Meta-diagnosis via Preference Relaxation for State Trackability 531
Xavier Pucel, Stéphanie Roussel, Louise Travé-Massuyès, and Valentin Bouziat

Model-Based Diagnosis of Time Shift Failures in Discrete Event Systems: A (Max,+) Observer-Based Approach 545
Claire Paya, Euriell Le Corronc, Yannick Pencolé, and Philippe Vialletelle

Innovative Technologies and Applications in Computer Intelligence

Adaptive Structural Deep Learning to Recognize Kinship Using Families in Wild Multimedia 559
Takumi Ichimura and Shin Kamada

Detecting Adversarial Examples for Time Series Classification and Its Performance Evaluation 569
Jun Teraoka and Keiichi Tamura

Efficient Data Presentation Method for Building User Preference Model Using Interactive Evolutionary Computation 583
Akira Hara, Jun-ichi Kushida, Ryohei Yasuda, and Tetsuyuki Takahama

Image-Based Early Detection of Alzheimer's Disease by Using Adaptive Structural Deep Learning 595
Shin Kamada, Takumi Ichimura, and Toshihide Harada

Decision Making Theory for Economics

Calculations of SPCM by Several Methods for MDAHP Including Hierarchical Criteria 609
Takao Ohya

Equilibria Between Two Sets of Pairwise Comparisons as Solutions of Decision-Making with Orthogonal Criteria 617
Takafumi Mizuno

Fluctuations in Evaluations with Multi-branch Tree Method for Efficient Resource Allocation 627
Natsumi Oyamaguchi

Foundations for Model Building of Intelligent Pricing Methodology 639
Marina Kholod, Yury Lyandau, Valery Maslennikov, Irina Kalinina, and Ekaterina Borovik

Informatization of Life Insurance Companies and Organizational Decision Making (Case of Nippon Life Insurance Company) 649
Shunei Norikumo

Value Measurement and Taxation Metrics in the Model-Building Foundations for Intelligent Pricing Methodology 659
Marina Kholod, Yury Lyandau, Elena Popova, Aleksei Semenov, and Ksenia Sadykova

Author Index 669

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Dr. Ireneusz Czarnowski is Professor at the Gdynia Maritime University. He holds B.Sc. and M.Sc. degrees in Electronics and Communication Systems from the same University. He gained the doctoral degree in the field of computer science in 2004 at Faculty of Computer Science and Management of Poznan University of Technology. In 2012, he earned a postdoctoral degree in the field of computer science in technical sciences at Wroclaw University of Science and Technology. His research interests include artificial intelligence, machine learning, evolutionary computations, multi-agent systems, data mining and data science. He is Associate Editor of the *Journal of Knowledge-Based and Intelligent Engineering Systems*, published by the IOS Press, and a reviewer for several scientific journals.

Dr. Robert Howlett is Executive Chair of KES International, a non-profit organization that facilitates knowledge transfer and the dissemination of research results in areas including intelligent systems, sustainability and knowledge transfer. He is Visiting Professor at Bournemouth University in the UK. His technical expertise is in the use of intelligent systems to solve industrial problems. He has been successful in applying artificial intelligence, machine learning and related technologies to sustainability and renewable energy systems; condition monitoring, diagnostic tools and systems; and automotive electronics and engine management systems. His current research work is focussed on the use of smart microgrids to achieve reduced energy costs and lower carbon emissions in areas such as housing and protected horticulture.

Dr. Lakhmi C. Jain received his Ph.D., M.E., B.E. (Hons) from the University of Technology Sydney, Australia, and Liverpool Hope University, UK and is Fellow of Engineers Australia. Professor Jain serves the KES International for providing a professional community the opportunities for publications, knowledge exchange, cooperation and teaming. Involving around 5000 researchers drawn from universities and companies worldwide, KES facilitates international cooperation and generates synergy in teaching and research. KES regularly provides networking opportunities for professional community through one of the largest conferences of its kind in the area of KES.