Final Technical Program

21st International Conference on
Intelligent Systems Design and Applications (ISDA'21)

21st International Conference on
Hybrid Intelligent Systems (HIS'21)

17th International Conference on
Information Assurance and Security (IAS'21)

13th International Conference on
Soft Computing and Pattern Recognition (SoCPaR'21)

13th World Congress on
Nature and Biologically Inspired Computing (NaBIC'21)

12th International Conference on
Innovations in Bio-Inspired Computing and Applications (IBICA'21)

11th World Congress on
Information and Communication Technologies (WICT'21)

MIR Labs Doctoral Symposium (DS 2021)

December 13-17, 2021

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SoCPaR: Session 1	15	11:00 - 13:00
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Plenary Talk 8 *Antônio de Padua Braga, Federal University of Minas Gerais, Brazil*	15	14:00 - 15:00
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Offline Paper Presentation Schedule (All times are listed in GMT)

Event	December	Time
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HIS	14	09:00 - 16:00
IAS	14	09:00 - 16:00
SoCPaR	15	09:00 - 16:00
NaBIC	15	09:00 - 16:00
IBICA	16	09:00 - 16:00
WICT	16	09:00 - 16:00

December 13, 2021 – Monday

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08:45 - 09:00 GMT: Conference Opening Ceremony

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09:00 – 10:00 GMT:
Plenary 1: Yukio Ohsawa, The University of Tokyo, Japan
Title: Elicitation of Feature Concepts as Data Federative Innovation Literacy
Chairs: Hanne Thomas and Dalia Kriksciuniene

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December 13, 2021 – Monday
10:00 – 12:00 GMT
ISDA 2021: Session 1
Chairs: Catarina Reis, Portugal

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7 Open-Ended Automatic Programming Through Combinatorial Evolution
Sebastian Fix, Thomas Probst, Oliver Ruggli, Thomas Hanne and Patrik Christen

8 Deep Face Mask Detection: Prevention and Mitigation of COVID-19
Sahar Dammak, Hazar Mliki and Emna Fendri

9 Extracting Emotion and Sentiment Quotient of Viral Information over Twitter Data
Pawan Kumar, Reiben Eappen Reji and Vikram Singh

16 Thoracic Disease Chest Radiographic Image Dataset: A Comprehensive Review
Priyanka Malhotra, Sheifali Gupta, Atef Zaguia and Deepika Koundal

35 Centrifugal Pump Fault Diagnosis Using Discriminative Factor-Based Features Selection and K-Nearest Neighbors
Zahoor Ahmad, Md Junayed Hasan and Jong-Myon Kim

38 Transfer Learning with 2D Vibration Images for Fault Diagnosis of Bearings under Variable Speed
Zahoor Ahmad, Md Junayed Hasan and Jong-Myon Kim

40 Performance evaluation of microservices featuring different implementation patterns
Leandro Costa and António N. Ribeiro

45 Imbalanced Learning for Robust Moving Object Classification in Video Surveillance Applications
Rania Rebai Boukhriss, Ikram Chaabane, Radhouane Guermazi, Emna Fendri and Mohamed Hammami

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December 13, 2021 - Monday
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ISDA 2021: Session 2
Chairs: João Ferreira, Portugal

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62 Automated Cattle Classification and Counting using Hybridized Mask R-CNN and YOLOv3 Algorithms
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50 Evidential Spammers and Group Spammers Detection
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53 Optimization of Artificial Neural Network: A bat algorithm-based approach
Tarun Kumar Gupta and Khalid Raza

54 ResD Hybrid Model Based on Resnet18 and Densenet121 for Early Alzheimer Disease Classification
Modupe Odusami, Rytis Maskeliunas, Robertas Damaševičius and Sanjay Misra

55 Quantum Ordering Points To Identify the Clustering Structure and Application to Emergency Transportation
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59 Lower Limb Movement Recognition Using EMG Signals
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66 Improving Speech Emotion Recognition system using spectral and prosodic features
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67 Spare Parts Sales Forecasting for Mining Equipment: Methods Analysis and Evaluation
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December 13, 2021 - Monday
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Chairs: Patrick Hung, Canada and Nuno Bettencourt, Portugal

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December 14, 2021 - Tuesday
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HIS 2021: Session 1
Chairs: Oscar Castillo, Mexico and Devi Priya, India

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30 A Hybrid deep learning algorithm combining Faster R-CNN with Region Proposal Network for Cotton leaf disease detection
Devi Priya R, Devisurya V, Anitha N, Dharani J, Geetha B and Kirithika R V

4 Analysis of Twitter User's Sentiment Against Covid-19 Vaccination Using the Lexicon Based Method
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12 Privacy Preservation Technique based on Sensitivity Levels for Multiple Numerical Sensitive Overlapped Attributes
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14 Feature Ranking Based Carrot Disease Recognition Using MIFS Method
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20 An Optimized Data Replication algorithms in Mobile Edge Computing Systems to reduce Latency in Internet of Things
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26 Spam Filtering of Mobile SMS using CNN--LSTM based Deep Learning Model
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28 Combating Depression through the Neural Analysis of Web Behavior
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39 Comparison of image pre-processing for classifying diabetic retinopathy using convolutional neural networks
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40 RAMP for the Capacitated Single Allocation p-Hub Location Problem
Telmo Matos

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December 14, 2021 - Tuesday
12:00 – 13:00 GMT:
Plenary 2: Juergen Branke, University of Warwick, Coventry, United Kingdom
Title: Learning to optimise – optimal learning
Chairs: Artūras Kaklauskas

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December 14, 2021 - Tuesday
13:00 – 14:00 GMT:
Plenary 3: Cengiz Toklu, Beykent University, Istanbul, Turkey
Title: Hybrid Algorithms. Applications to Structural Mechanics
Chairs: Tzung-Pei Hong and Shynu PG

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December 14, 2021 - Tuesday
14:00 – 15:00 GMT:
Plenary 4: Günther Raidl, Technische Universität Wien, Austria
Title: Combinatorial Optimization Meets (Reinforcement) Learning
Chairs: Shynu PG

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December 14, 2021 - Tuesday
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Plenary 5: Kalyanmoy Deb, Michigan State University, East Lansing, Michigan, USA
Title: Customized Evolutionary Optimization for Practical Problem Solving
Chairs: Andries Engelbrecht and Kingsley Okoye

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December 14, 2021 - Tuesday
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HIS 2021: Session 2
Chairs: Christen Patrik, Germany and Rupesh Kumar Dewang, India

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Anjali Verma and Rashmi Soni

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46 Convolutional Neural Network Design using a Particle Swarm Optimization for Face Recognition
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50 Speech Enhancement using Generative Adversarial Network (GAN)
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54 The Pandemic Impact on Organizations Security and Resiliency: The Workflow Satisfiability Problem
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December 15, 2021 - Wednesday
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Chairs: Yamin Li, Japan and Rania Rebai Boukhriss, Tunisia

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6 PLS Algorithm for deciding on buying Innisfree cosmetics: Evidence from Vietnam
Nguyen Ngan and Bui Khoi

9 Detecting Vulnerabilities Using Open Source Intelligence
S. Jai Balaji and Karmel A

10 Shift-Sub Modular Multiplication Algorithm and Hardware Implementation for RSA Cryptography
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11 Lightweight Cryptography for Resource Constrained Devices
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13 Tampering Localization using Divergence in First Digit Probability Distribution
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17 Analyzing Tongue Images to Predict the Organ Affected
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20 Protection Guidelines for Blockchain based Digital Identity
Akshay Pillai, Vishal Saraswat and Arunkumar V. R.

22 Role of Blockchain in the Healthcare Sector: Challenges, Opportunities and its Uses in Covid-19 Pandemic
Senthil Kumar Arumugam and Aarti Mehta Sharma

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December 15, 2021 - Wednesday
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Plenary 6: Oscar Cordon, University of Granada, Spain
Title: Hybrid Intelligent Systems for Forensic Anthropology and Human Identification
Chairs: Artūras Kaklauskas and Varun Menon

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December 15, 2021 - Wednesday
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SoCPaR 2021: Session 1
Chairs: Deepika Koundal, India

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06 Synchronized Conceptual Representations in Unsupervised Generative Learning
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08 The Xoshiro+ Pseudorandom Number Generator in a Computer Chess Program
Tim Schären, Thomas Hanne and Rolf Dornberger

09 IISCAN: Index-based Incremental Structural Clustering Technique for Billion-edge graphs
Santhosh Kumar D K and Demian Antony D'Mello

16 Stance Detection on Vietnamese Social Media
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23 An efficient Deep Self-Learning Artificial Orca Algorithm for Solving Ambulance Dispatching and Calls Covering Problem
Lydia Sonia Bendimerad and Habiba Drias

24 Knee Abnormality Diagnosis Based on Electromyography Signals
Sali Issa and Adel Rohamn Khaled

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Shekhar Karanwal and Manoj Diwakar

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31 Automated Diagnosis of Diseases Using Integrated Machine Learning Approaches
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48 A Machine Learning Approach for Steel Surface Textural Defect Classification based on Wavelet Scattering Features and PCA
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December 15, 2021 - Wednesday
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Plenary 7: Andries Engelbrecht, University of Stellenbosch, South Africa
Title: Set-based Particle Swarm Optimization Approach to Portfolio Optimization
Chairs: Dalia Kriksciuniene and Anu Bajaj

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December 15, 2021 - Wednesday
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Plenary 8: Antônio de Padua Braga, Federal University of Minas Gerais, Brazil
Title: Large margin classification with graph-based models
Chairs: Varun Menon and Aswathy SU

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December 15, 2021 - Wednesday
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SoCPaR 2021: Session 2
Chairs: Giuseppe Coviello, Italy and Abdultaofeek Abayomi, South Africa

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70 Learning Students' Intents for Better Conversations
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December 16, 2021 - Thursday
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NaBIC 2021: Session 1
Chairs: André Santos, Portugal and Ankit Gupta, India

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3 A Simplified Vowel-like Speech Detection Method and its FPGA Implementation
Sarmila Garnaik, Shasanka Sekhar Rout and Kabiraj Sethi

5 A Genetic Algorithm to Solve the Order Picking Problem in a Warehouse with Systematic Item Distribution
Etienne Frey, Marco Orefice, Thomas Hanne and Rolf Dornberger

10 Pre and Post operative Brain Tumor segmentation and classification for Prolonged survival
Sobha Xavier P, Raju G and Aswathy S U

12 Swarm Intelligent approaches for ambulance dispatching and emergency calls covering: Application to COVID-19 spread in Saudi Arabia.
Lydia Sonia Bendimerad, Naila Aziza Houacine and Habiba Drias

20 Path Planning Techniques for Mobile Robots: A Review
Prases Kumar Mohanty, Anand Kumar Singh, Amit Kumar and Manjeet Kumar Mahto

21 Multi Sensor Underwater Image fusion using Modified Filter Bank Reconstruction Model
Devika Sarath and Sucharitha M

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December 16, 2021 - Thursday
10:30 – 13:00 GMT
IBICA 2021: Session 1
Chairs: Nidhi Sindhwani, India and Shankru Guggari, India

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2 BIC Algorithm for Heineken Brand Awareness in Vietnam Market
Nguyen Ngan and Bui Khoi

4 Comparison of Ant Colony Optimization Algorithms for Small-Sized Travelling Salesman Problems
Arcsuta Subaskaran, Marc Krähemann, Thomas Hanne and Rolf Dornberger

6 Tamilnadu Omnibus travels evaluation using TOPSIS and fuzzy TOPSIS methods
Vadivel S M, Sunil Kumar Jauhar, A H Sequeira and Chandana V

7 A Hybrid Feature Extraction Method using SeaLion Optimization for Meningioma Detection from MRI Brain Image
Aswathy S U, Divya Stephen, Bibin Vincent and Prajoon P

9 A survey on Arrhythmia disease detection using Deep Learning methods
Lufiya George C, Jyothi Thomas and Aswathy S.U

13 Comparison of Different Machine Learning Methods to Detect Fake News
Tanishka Badhe, Janhavi Borde, Vaishnavi Thakur, Bhagyashree Waghmare and Anagha Chaudhari

16 A Markov Model for Improving the Performance of COVID-19 Contact Tracing App
Abdessamad Bellouch, Ahmed Boujnoui, Abdellah Zaaloul, Abdelkrim Haqiq and Aboul Ella Hassanien

19 A Comparative Study of Three LoRa Collision Resolution Schemes: A Markov Model-based Approach
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22 Data Prediction Modeling Wireless Sensor Networks: A Machine Learning Approach
Khushboo Jain, Manali Gupta and Ajith Abraham

26 Improving 3D Plankton Image Classification with C3D2 Architecture and Context Metadata
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30 A Review on MOEA and Metaheuristics for Feature-Selection
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31 Detection and Classification of Age-Related Macular Degeneration using Integeration of DenseNet169 and Convolutional Neural Network
Ajesh F and Ajith Abraham

35 Detection of Social distance and intimation system for Covid-19
Anandamurugan S, Saravana Kumar M and Prashanth E G

44 Deep Neural Network Model for Automatic Detection of Citrus Fruit and Leaf Disease
Deva Dharshini Balakrishnan, Ayesha Howla J and Ranjith T

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December 16, 2021 - Thursday
13:00 – 14:00 GMT:
Plenary 9: Frédéric Guinand, Le Havre Normandy University, France
Title: Swarms of Unmanned Aerial Vehicles
Chairs: Anu VR and Anu Bajaj

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December 16, 2021 - Thursday
14:00 – 15:00 GMT:
Plenary 10: Marco Dorigo, Université Libre de Bruxelles, Belgium
Title: Improving controllability, robustness and security of robot swarms
Chair: Ana Maria Madureira

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December 17, 2021 - Friday
09:00 – 11:00 GMT
WICT 2021: Session 1
Chair: Hanne Thomas, Switzerland

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6 Kubernetes for Fog Computing - Limitations and Research Scope
Abdeen Omer

8 Design and Simulation of 2.4GHz Microstrip Parallel Coupled Line Low pass Filter for Wireless Communication System
Shamsuddeen Yusuf, Shuaibu Musa Adam, Adamu Idris, Vijayakumar Nanjappan, David Afolabi and Ka Lok Man

15 A new Cascade-hybrid Recommender System approach for the Retail Market
Miguel Ângelo Rebelo, Duarte Coelho, Ivo Pereira and Fábio Fernandes

16 A novel Deep Neural Network based approach for Alzheimer's disease classification using Brain Magnetic Resonance Imaging (MRI)
Ruhul Amin Hazarika, Debdatta Kandar and Arnab Kumar Maji

17 Classification of Cognitive Ability from multichannel EEG Signals using Support Vector Machine
Nilima Salankar

18 Heterogeneous DBSCAN for emergency call management: A case study of COVID-19 calls based on hospitals distribution in Saudi Arabia.
Naila Aziza Houacine, Lydia Sonia Bendimerad and Habiba Drias

40 Computer Graphics Rendering Survey: From Rasterization and Ray Tracing to Deep Learning
Houssam Halmaoui and Abdelkrim Haqiq

41 A Sentiment-Based Approach to Predict Learners' Perceptions towards YouTube Educational Videos
Rdouan Faizi

44 A Modified Feature Optimization Approach with Convolutional Neural Network for Apple Leaf Disease Detection
Vagisha Sharma, Amandeep Verma and Neelam Goel

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December 17, 2021 - Friday
11:00 – 13:00 GMT
WICT 2021: Session 2
Chairs: André Santos, Portugal and Mahendra Kanojia, India

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48 Mitigating Security problems in Fog Computing System
Shruti Shruti and Shalli Rani

45 Ontology based knowledge visualization for domestic violence cases
Tanaya Das, Abhishek Roy and Arun Majumdar

51 Non-invasive flexible electromagnetic sensor for potassium level monitoring in sweat
Gianvito Mevoli, Claudio Maria Lamacchia and Luciano Mescia

54 Wireless Sensor Networks Time Synchronization Algorithms and Protocols Message Complexity Comparison: the small-size star-topology case
Giuseppe Coviello, Gianfranco Avitabile and Antonello Florio

57 Automatic Modulation Recognition Models Based on Transfer Learning and Simulated Radio Signals in AWGN Channels
Jamiu R. Olasina, Emmanuel Adetiba, Abdultaofeek Abayomi, Obiseye Obiyemi, Surendra Thakur and Sibusiso Moyo

30 Educational Workflow Model for Effective and Quality Management of E-Learning Systems Design and Development: A Conceptual Framework
Kingsley Okoye

61 Dynamic modelling of a thermal solar heating system
José Boaventura and Judite Ferreira

62 A Review of Unpredictable Renewable Energy Sources through Electric Vehicles on Islands
Juliana Chavez, João Soares, Zita Vale, Bruno Canizes and Sérgio Ramos

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December 17, 2021 - Friday
13:00 – 16:00 GMT
Doctoral Symposium
Chairs: Giovanna Castellano, Italy; Katarzyna Kaczmarek-Majer, Poland and
Gennaro Vessio, Italy

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December 17, 2021 - Friday
16:00 GMT – Conference Closing Ceremony

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ISDA 2021- OFFLINE PRESENTATIONS

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HIS 2021 – OFFLINE PRESENTATIONS

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2 YOLOv5 Based Deep Convolutional Neural Networks for Vehicle Recognition in Smart University Campus
Hoang Thi Huong Tra and Ha Duyen Trung

7 Dual Connectivity Handoff Analysis for ENDC C/U-plane Split NSA NR5G Networks.
Vamshi S and Sanjay Dhar Roy

9 Blockchain Integrated Machine Learning for Training Autonomous Cars
Dhurv Agarwal, Amit Kumar Tyagi, Terrance Frederick Fernandez and Rohit Bansal

17 Designing Knowledge-Based Systems for COVID-19 Diagnosis
Rana Fawzi, Mahmoud Ghazy and Lydia Rizkallah

22 Prediction of malnutrition among pregnant women and infants in tribal areas of Tamil Nadu using classification algorithms
Anitha N, Devi Priya R, Rajadevi R, Madhumitha G, Arunkumar A and Nadha M.A

27 A Convenient Method & Design for Constructing an IoT-based Smart Automated Sanitization System
Md. Sayeduzzaman, Md. Samiul Islam Borno, Khadija Yeasmin Fariya and Md. Tamim Ahmed Khan

31 Bitcoin Value Prediction
Sangeetha R G, Hemanth C, Naman Arora, Karan Singh and Vithika Mulye

32 Automatic Algorithm Multi-Configuration Applied to an Optimization Algorithm
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33 Credit Card fraud Detection using Machine Learning and Predictive Models: Comparative Study
Sejal Zambare, Mrunali Yewale, Sakshi Tendulkar, Atharv Sontakke and Anagha Chaudhari

38 An intelligent and efficient safe driving system
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47 Machine Learning-Based Precipitation Prediction Using Cloud Properties
Abdulaziz Tunde Yakubu, Abdultaofeek Abayomi and Naven Chetty

48 Performance Analysis of the New Filtering Algorithm with Kalman on Indoor Positioning System
Lucas Susanto and Tohari Ahmad

49 Credit Card Fraud Detection using K-Means Combined with Supervised Learning
Shreyans Jain, Nishant Verma, Rashid Ahmed, Aman Tayal and Hemant Rathore

51 Sentiment Analysis of IMDb Movie Reviews: A Comparative Analysis of Feature Selection and Feature Extraction Techniques
Gahina Karak, Shubham Mishra, Arkadyuti Bandyopadhyay, Pavirala Ranga Sai Rohith and Hemant Rathore

52 Implementing an Arabic Question Answering System using Conceptual Graphs

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IAS 2021- OFFLINE PRESENTATIONS

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7 Blockchain: A Compendium on Contemporary Privacy Preservation Approaches and its Manifestation in Varied Realms
Leda Kamal and Jeberson Retnaraj

12 Privacy Preserving Data Mining Technique to Secure Distributed Client Data
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Plenary Speakers – Abstract and Biographies

Speaker 1: Antônio de Padua Braga, Federal University of Minas Gerais, Brazil

Title: Large margin classification with graph-based models

Abstract: Autonomous learning systems have been the subject of attention of the machine learning community in recent years. The need for methods that are capable of learning and computing in the edge has demanded models that are less computational intensive and less dependent on user interaction and on large computational systems to run optimization algorithms. Classification methods often require trade-off between objective functions related to model fitness to data and to the complexity of the problem. It has been usually treated with multi-objective or constrained optimization approaches, and trade-off accomplished according to user-defined hyperparameters, e.g. regularization. Distance-based classification methods require less user interaction to set parameters, since they are based on a pre-established metric and on the structure of the training data, however, margin maximization and separation surface smoothing need also to be treated. This presentation will describe geometrical approaches for obtaining large margin classifiers which are less user dependent and more feasible to embedded systems implementations. The methods aim at exploring the geometrical properties of the dataset considering only the structure of a Gabriel graph, which represents pattern relations according to a given distance metric. Once the graph is generated, structural support vectors (analogous to SVM's support vectors) are obtained in order to yield the final large margin solution. All parameters of the methods are extracted from the graph or according to graph properties, so autonomous learning can be accomplished considering that the final classifier is fully extracted from the graph. Present topics of research include treating scalability issues associated to the learning set size and exploring further graph properties to set implicit regularization of the separating surface.

Biography: Antonio de Padua Braga is a Professor at Department of Electronics Engineering at Federal University of Minas Gerais, Brazil. He has been working in the field of Artificial Neural Networks since the early 1990s, when he obtained his PhD from Imperial College London for his work on storage capacity of recurrent binary neural networks. Since then he has co-authored many books, book-chapters, journal and conference papers and has supervised many postgraduate students. He was a Visiting Professor at University of Alberta (Canada), and also at Université Paris-Est (France). As a research leader he has received many grants from Brazilian researchagencies and from private companies. He has also served as Associate Editor of international journals as IEEE Transactions on Neural Networks and Learning Systems, Neural Processing Letters and Engineering Applications of Artificial Intelligence.

Speaker 2: Juergen Branke, University of Warwick, Coventry, United Kingdom

Title: Learning to optimise – optimal learning

Abstract: This talk discusses the relationship between machine learning and optimisation. It demonstrates that many machine learning problems are actually optimization problems, and could benefit from advances in operational research. On the other hand, the latest challenges in optimisation, such as parameter tuning, algorithm selection, Hyper heuristics or handling of uncertainty are actually closely related to machine learning. Furthermore, recent algorithmic developments such as Bayesian Optimisation very much blur the boundary between machine learning and optimisation, as they explicitly combine learning about the search space with optimisation.

Biography: Juergen Branke is Professor of Operational Research and Systems at the University of Warwick (UK). He has been working in the area of metaheuristics for over 25 years, and applied them to a wide variety of problems, including optimisation under uncertainty, dynamically changing optimisation problems, and multi-objective optimisation. Juergen has published almost 200 papers in international peer-reviewed journals and conferences. He is Editor of the ACM Transactions on Evolutionary Learning and Optimization, Area Editor of the Journal of Heuristics and the Journal on Multi-Criteria Decision Analysis, as well as Associate Editor of IEEE Transactions on Evolutionary Computation and the Evolutionary Computation Journal.

Speaker 3: Oscar Cordon, University of Granada, Spain

Title: Hybrid Intelligent Systems for Forensic Anthropology and Human Identification

Abstract: Skeleton-based forensic identification methods carried out by anthropologists, odontologists, and pathologists represent the first step in every human identification (ID) process and the victim's last chance for identification when DNA or fingerprints cannot be applied. They include methods as biological profiling (BP), comparative radiography (CR), craniofacial superimposition (CFS), and comparison of dental records. BP involves the study of skeletal remains to find characteristic traits (age, sex, stature, and ancestry) that support determining the identity of the individual. It plays a crucial role in narrowing the range of potential matches during the process of ID, prior to the corroboration by any ID technique. CR considers the ante-mortem (AM) and post-mortem (PM) comparison of different bones and cavities (skull frontal sinuses, clavicles, patellae, …) which have been reported as useful for positive identification based on their individuality and uniqueness. CFS aims to overlay a skull with some AM images of a candidate in order to determine if they correspond to the same person. However, practitioners still follow an observational paradigm using subjective methods introduced many decades ago; namely, oral description and written documentation of the findings obtained and the manual and visual comparison of AM and PM data. Designing systematic, automatic ad trustworthy methods to support the forensic anthropologist when applying BP, CFS and CR, avoiding the use of subjective, error-prone and time-consuming manual procedures, is mandatory to enhance forensic ID. The use of hybrid intelligent systems (in particular evolutionary algorithms, fuzzy sets and deep learning), computer vision (3D-2D image registration and image processing), and explainable machine learning is a natural way to achieve this aim. This plenary talk is devoted to present three hybrid intelligent systems for CFS, CR, and skeleton-based age-at-death assessment developed in collaboration with the University of Granada's Physical Anthropology Lab within a fifteen years long research project. One of those systems is protected by an international patent, exploited by Panacea Cooperative Research, and is under commercialization in different countries.

Biography: Oscar Cordón was the Founder and a Leader of the Virtual Learning Center (2001-05) and the Vice President of Digital University (2015-19) with the University of Granada (UGR). He was one of the Founding Researchers with the European Centre for Soft Computing (2006-11), being contracted as Distinguished Affiliated Researcher until December 2015. He is currently a Professor with the UGR. He has been, for >25 years, an internationally recognized contributor to Research and Development Programs in fundamentals and real-world applications of computational intelligence. He has published >390 peer-reviewed scientific publications, including a research book on Genetic Fuzzy Systems (with >1400 citations in Google Scholar) and 113 JCR-SCI-indexed journal papers (67 in Q1 and 38 in D1), advised 20 Ph.D. dissertations, and coordinated 38 research projects and contracts (with an overall amount of >9M€). From June 2021, his publications had received 5439 citations (H-index=39), being included in the 1% of most-cited researchers in the world (source: Web of Science), with 14850 citations and H-index=58 in Google Scholar. He also has a granted international patent on an intelligent system for forensic identification commercialized in Mexico and South Africa.
He received the UGR Young Researcher Career Award (2004), the IEEE Computational Intelligence Society (CIS) Outstanding Early Career Award (2011, the first such award conferred), the IFSA Award for Outstanding Applications of Fuzzy Technology (2011), the National Award on Computer Science ARITMEL by the Spanish Computer Science Scientific Society (2014), the IEEE Fellow (2018), the IFSA Fellowship (2019), and the Recognition for Scientific Career and Promotion of Artificial Intelligence by the Spanish

Association for Artificial Intelligence (2020). He was a member of the High-Level Expert Group that developed the Spanish R&D Strategy for Artificial Intelligence by the Spanish Ministry of Science, Innovation and Universities (2018-19). He is currently or was Associate Editor of 19 international journals. He was recognized as an Outstanding Associate Editor of IEEE Transactions on Fuzzy Systems (2008) and of IEEE Transactions on Evolutionary Computation (2019). Since 2004, he has taken many different representative positions with EUSFLAT and the IEEE Computational Intelligence Society.
His current research lines are on artificial intelligence for forensic identification (with the UGR Physical Anthropology lab and several international forensic labs and security forces) and agent-based modeling and social network analysis for marketing (with R0D Brand Consultants in projects for CAPSA, Mercedes, Jaguar-Land Rover, El Corte Inglés, Telefónica, Samsung, Coca Cola Europe, Cola Cao, WiZink, …).

Speaker 4: Kalyanmoy Deb, Michigan State University, USA

Title: Customized Evolutionary Optimization for Practical Problem Solving

Abstract: Evolutionary optimization methods are increasingly being used for practical problem-solving tasks. It has been well established that no one optimization algorithm will be best for all problems. Even after many decades of studies, not much attention is placed in choosing or developing an appropriate optimization algorithm for a problem. In this lecture, we highlight the importance of developing a "customized" algorithm for routinely solving a problem class, rather than borrowing a standalone generalized optimization algorithm for every problem. Evolutionary optimization methods provide an ideal platform for developing a customized procedure. We shall support our argument by presenting a number of case studies involving single and multi-objective optimization problems from practice.

Biography: Kalyanmoy Deb is University Distinguished Professor and Koenig Endowed Chair Professor at Department of Electrical and Computer Engineering in Michigan State University, USA. Prof. Deb's research interests are in evolutionary optimization and their application in multi-criterion optimization, modeling, and machine learning. He was awarded IEEE Evolutionary Computation Pioneer Award for his sustained work in EMO, Infosys Prize, TWAS Prize in Engineering Sciences, CajAstur Mamdani Prize, Distinguished Alumni Award from IIT Kharagpur, Edgeworth-Pareto award, Bhatnagar Prize in Engineering Sciences, and Bessel Research award from Germany. He is fellow of IEEE and ASME. He has published over 575 research papers with Google Scholar citation of over 190,000 with h-index 127.

Speaker 5: Andries Engelbrecht, University of Stellenbosch, South Africa

Title: Multi-guide Particle Swarm Optimization for Multi- and Many-Objective Optimization

Abstract: The multi-guide particle swarm optimization (MGPSO) algorithm has originally been developed to solve multi-objective optimization problems. The MGPSO is a subswarm approach, where each subobjective is optimized by a separate swarm. In order to facilitate finding of non-dominated solutions and convergence to a Pareto-front, the particle velocity update is adapted by adding an archive guide term. The archive term serves as a mechanism to transfer knowledge about the non-dominated solutions throughout all subswarms. This talk will introduce the MGPSO algorithm and will present results to show that it performs excellently with reference to state-of-the-art approaches. The talk will then proceed to discuss the control parameters of the MGPSO, providing theoretically derived stability conditions on the control parameters to ensure that an equilibrium state is reached, to present alternative strategies to adapt the archive balance coefficient, and to analyze the importance of the control parameters. Due to the simplicity of the approach, and the use of subswarms, then MGPSO is easily scaled to many-objectives. The talk will present results to illustrate the scalability of the MGPSO in comparison with other many-objective optimization algorithms.

Biography: Prof Andries Engelbrecht received the Masters and PhD degrees in Computer Science from the University of Stellenbosch, South Africa, in 1994 and 1999 respectively. He is currently appointed as the Voigt Chair in Data Science in the Department of Industrial Engineering, with a joint appointment as Professor in the Computer Science Division, Stellenbosch University. Prior to 2019, he was appointed appointed in the Department of Computer Science, University of Pretoria (1998-2018), where he served as the head of the department (2008–2017), South African Research Chair in Artificial Intelligence (2007–2018), and Director of the Institute for Big Data and Data Science (2017–2018). His research interests include swarm intelligence, evolutionary computation, artificial neural networks, machine learning, data analytics, and the application of these artificial intelligence paradigms to data mining, data clustering, finance, and difficult optimization problems. He is author of two books, “Computational Intelligence: An Introduction” and “Fundamentals of Computational Swarm Intelligence”. He serves as an associate editor for Swarm Intelligence, IEEE Transactions on Evolutionary Computation, IEEE Transactions on Neural Networks and Learning Systems, Engineering Applications of Artificial Intelligence, and Complex and Intelligent Systems.

Speaker 6: Frédéric Guinand, Le Havre Normandy University, France

Title: Swarms of Unmanned Aerial Vehicles

Abstract: Following big military drones and prototypes dedicated to scientific studies, lightweight drones are now very common and will probably be part of our daily life in a near future. Their agility and low cost make them very attractive for testing new usages. Their use is spreading every day more, in a growing number of domains: audiovisual, industrial inspection and maintenance, security, precision agriculture, surveillance, photogrammetry and cartography, archeology, transportation and logistics, health, leisure, disaster management, rescue, etc. Mainly, these activities rely on the use of only one UAV (fixed wing of multirotor) or on a group of remotely and individually piloted drones. However, for few years, a new challenge has been engaged by major actors of the domain: a challenge aiming at flying simultaneously many drones in groups, a challenge leading to a kind of "race for records". Thus, in 2015, Intel deployed 100 drones, establishing a word record for the largest number of UAVs flying simultaneously, a small number in comparison to the 1374 machines deployed by Ehang Egret three years later in the city of Xi'an, record broken again the same year by Intel at the occasion of the celebration of the 50th anniversary of the company. The, up-to-now, last milestone was reached in March 2021 by Genesis, the luxury vehicle division of Hyunday, with 3281 UAVs drawing in the sky the brand logo. While impressive, these demonstrations organize the flights as choregraphies. After many hours of simulation, drones are programmed and every movement of every drone is computed offline and controlled online during the demonstration. Beyond the show, for a large number of agricultural, industrial or service activities, the choreographic approach is not a possible option insofar as it does not allow the swarm to adapt to the conditions, sometimes changing, of the mission.
The expected benefit of deploying a swarm of drones is to achieve certain objectives that remain beyond the reach of a single drone, in particular when the task to be handled is constrained in time and space. These systems are in fact capable of dealing with problems arising from rapidly evolving phenomena and/or requiring a significant geographic coverage which changes under time constraints, in an original and robust manner. If the deployment of several individually piloted drones partially removes these limitations, it requires the availability of a team of pilots and drastic coordination rules to avoid problems in flight while ensuring the success of the mission. The only way of exploiting the full potential of swarms of drones is to endow them with autonomy in making decisions on the basis of local information (sensors, communications between drones). In this talk we will deal with autonomous swarms of drones, systems relying neither on a central coordination station nor on pre-programmed plans for the mission, systems in which each drone takes its own decisions based on communications with peers and/or data stemmed from embedded sensors, camera or other devices carried by the drone itself.

Biography: Dr. Frédéric Guinand received MSc degree in Computer Science in 1991, and PhD degree in Computer Science in 1995 both from Grenoble Institute of Technology (France). Engineer in a startup in 1996 for developing Internet activities, he obtained an INRIA postdoc fellowship for working at the Swiss Federal Institute of Technology of Lausanne (EPFL, Switzerland). In 1997 he joined Le Havre University as Assistant Professor and he was appointed to a Full Professor in 2005. His research interests are in the areas of dynamic graph theory, distributed and mobile computing, nature-inspired computing and collective robotics. Currently co-chair of the Complex System research axis of CNRS Normastic federation, he is also Visiting Professor at the Department of Mathematics and Natural Science at Cardinal Stefan Wyszynski University in Warsaw.

Speaker 7: Cengiz Toklu, Beykent University, Istanbul, Turkey

Title: Hybrid Algorithms. Applications to Structural Mechanics

Abstract: Metaheuristics algorithms (MAs), together with neural networks, in conscious use since several decades, formed a real revolution in solving optimization problems in all fields of science and engineering. Versatility of MAs made them indispensable when attacking any kind of optimization problem with all kinds of variables, with convex and non-convex areas of definition, involving functions with undefined gradients and constraints of any sort, with one or more objectives, with unique or non-unique solutions, etc. Their extremely high level of popularity made that many a different type of MAs have been forwarded until now, some quite different than others, some being difficult to differentiate from the others, based on metaphors from quite different fields like life sciences, physics, metallurgy, sociology, etc. The number of MAs created in this way can be estimated as 200 or more. It is seen that all algorithms forwarded are successful, perhaps not for all problems, but certainly for some. Applications have shown that, in solving a problem, instead of using an algorithm from the start to the end, a hybrid application, i.e., using more than one algorithm alternatively or in parallel, may be a better procedure as far as speed and accuracy is concerned. It can be seen in the literature that this hybridization can be done not only between MAs, but other types of algorithms as well can be considered in this procedure. An important area of application of MAs, hybridized or not, is structural mechanics, i.e., structural design and structural analysis. In this presentation, after giving some generalities of hybrid algorithms, their applications on structural mechanics will be discussed based on studies some of which are carried out in our group.

Biography: Professor Toklu obtained his BS and MS degrees in Civil Engineering from Middle East Technical University, Ankara Turkey and his doctorate from Universite de Pierre et Marie Curie (Paris VI), Paris, France. In his professional life he directed and/or supervised numerous giant construction projects in Turkey, including a pontoon bridge, a long span suspension bridge, a light railed transportation system, and several motorways. In academic life he taught in several universities starting with Middle East Technical University, serving in many cases as Department Head or Dean. Being a member of several technical and scientific international and national organizations, he is currently affiliated to Beykent University in Istanbul, Turkey. His research interests include application of optimization techniques to engineering, application of Artificial Intelligence concepts to engineering, space civil engineering, nonlinear analysis of structures, engineering education and constructionscheduling. He is the author of several books, book chapters and scientific articles. He has organized many congresses and served as keynote speaker in many international meetings. Dr. Toklu is the developer of the method “Total Potential Optimization using Meta-heuristic Algorithms (TPO/MA)” that gave way to the method Finite Element Method with Energy Minimization (FEMEM) which is shown to be more successful than classical methods in analyzing non-linear structural systems, under-constrained structures, unstable structures, degenerate structures and structures with non-unique deformed shapes. His current research is on producing lunar soil simulant and lunar construction materials including lunar bricks, lunar concrete, and the like.

Speaker 8: Günther Raidl, Technische Universität Wien, Austria

Title: Combinatorial Optimization Meets (Reinforcement) Learning

Abstract: The machine learning boom of the last years also led to interesting new developments in the area of combinatorial optimization. Classical optimization techniques for approaching hard combinatorial problems include many based on tree search, frequently in combination with linear programming or constraint propagation, but also various kinds of metaheuristics. While end-to-end machine learning approaches are still far from replacing these classical techniques, it has been recognized that the latter may benefit from incorporating learning components for certain purposes. One may say the aim is to ``learn how to better optimize''. This talk will give an overview on some promising recent developments in this direction. For example, for branch-and-bound, approaches have been proposed that learn better performing branching and node selection strategies. In beam search, guidance heuristics may be learned that yield better results than leading manually crafted heuristics. In the area of metaheuristics, we will look at large neighborhood search approaches where the construction of the neighborhoods is learned. Some of these methods rely on imitation or supervised learning approaches where labeled training data or some powerful other method to learn from need to be available. More versatile may be methods based on reinforcement learning principles, on which we will also have a look at.

Biography: Günther Raidl is Professor at the Institute of Logic and Computation, TU Wien, Austria, and member of the Algorithms and Complexity Group. He received his PhD in 1994 and completed his habilitation in Practical Computer Science in 2003 at TU Wien. In 2005 he received a professorship position for combinatorial optimization at TU Wien. His research interests include algorithms and data structures in general and combinatorial optimization in particular, with a specific focus on metaheuristics, mathematical programming, intelligent search methods, and hybrid optimization approaches. His research work typically combines theory and practice for application areas such as scheduling, network design, transport optimization, logistics, and cutting and packing. Günther Raidl is associate editor for the INFORMS Journal on Computing and the International Journal of Metaheuristics and at the editorial board of several journals including Algorithms, Metaheuristics and the Evolutionary Computation. He is co-founder and steering committee member of the annual European Conference on Evolutionary Computation in Combinatorial Optimization (EvoCOP). Since 2016 he is also faculty member of the Vienna Graduate School on Computational Optimization. Günther Raidl has co-authored a text book on hybrid metaheuristics and over 180 reviewed articles in scientific journals, books, and conference proceedings. Moreover, he has co-edited 13 books and co-authored one book on hybrid metaheuristics. More information can be found at http://www.ac.tuwien.ac.at/raidl.

Speaker 9: Yukio Ohsawa, The University of Tokyo, Japan
Title: Elicitation of Feature Concepts as Data Federative Innovation Literacy
Abstract: Since 2000, the speaker has initiated and embodied Chance Discovery, a subdomain of data science, meaning to detect and explain a chance, that is a piece of high-utility information as part of data about events meaningful for human's decision making. At that time, he thought a network of networks can be the essential model for representing the latent dynamics where an edge between networks is linked to a chance. Then, he extended the methods of chance discovery for explaining the utility of datasets, via the analogy between an event as the base and the metadata of a dataset as the target. As well as the base problem of chance discovery, that is to explain the utility of information about an event considering its relation to other events, the utility of a dataset as the target goal could be explained its relation to other datasets. However, he found information obtained from a dataset created by a combination of different but connectable (sharing attributes and/or purpose of using) datasets is essentially hard to interpret because the same analysis models as of the original datasets cannot be applied directly due to the difference in the requirements of data user(s). Thus, it comes to be an important problem to elicit a new "feature concept" for target data. A feature concept is a model of the concept to be retrieved from data that cannot be represented by a simple feature such as a single variable but can be by a conceptual illustration. Decision trees, Clusters, and even deep neural networks can be positioned as examples of feature concepts. A useful feature concept for satisfying a requirement of a data user has been elicited via creative communication using Data Jackets among data providers, data users, and other stakeholders in the market of data. In this keynote, the history of chance discovery and data-jacket-based design of creative communication is reviewed with some cases of application -- marketing, detection of earthquake precursors, suppression of COVID-19 spreading risk, etc, cases and highlight the feature factors elicited and used in these examples. An essential message here is that sharing and using/reusing feature concepts is literacy for data-federative innovations.
Biography: Yukio Ohsawa is a professor of Systems Innovation in the School of Engineering, The University of Tokyo. He received BE, ME, and PhD in from the School of Engineering, The University of Tokyo (1995). Then worked for the School of Engineering Science in Osaka University (research associate, 1995-1999), Graduate School of Business Sciences in University of Tsukuba (associate professor, 1999-2005), and moved back to The Univ. of Tokyo. He started researches from non-linear optics, and, via artificial intelligence, created a new domain chance discovery meaning to discover events of significant impact on decision making, since year 2000. About chance discovery he gave keynote talks in conferences such as International Symposium on Knowledge and Systems Sciences, Intl Conf. on Rough Sets and Fuzzy Sets, Joint Conf. on Information Sciences, Knowledge-Based Intelligent Information and Engineering Systems, etc. Chance discovery came to be embodied as innovators? marketplace, a methodology for innovation borrowing principles of the dynamics of markets. Then he, when biking from his job in a business school, invented the basic idea of Data Jackets. Since then, he is introducing the method presented in this book to sciences, educations, and businesses. His original concepts and technologies have been published as books and monographs from global publishers such as Springer Verlag, Taylor & Francis, etc. Two most important books among them are, Chance Discovery (2003 Springer, foreword given by Eric von Hippel), Innovators Marketplace: Using Games to Activate and Train Innovators (2012 Springer, foreword given by Larry Leifer). He edited special issues as guest editors for journals, mainly relevant to chance discovery, such as Intelligent Decision Technologies (2016), Information Sciences (2009), New Generation Computing (2003), Journal of Contingencies and Crisis Management (2002), etc. As the program chair of the Annual Conference of The Japanese Society on Artificial Intelligence, he came to be the first to change this domestic conference into an international conference from June 2019.

Speaker 10: Marco Dorigo, Université Libre de Bruxelles, Belgium

Title: Improving controllability, robustness and security of robot swarms

Abstract: In the first part of the talk, I will discuss the concept of a mergeable nervous system for robot swarms and present experimental results that show how it can be used to design and implement swarms of robots that are easier to control and that can self-repair. In the second part, I will present some recent results of research aimed to improve security in robot swarms via the use of Merkle trees and of the blockchain.

Biography: Marco Dorigo received the Laurea, Master of Technology, degree in industrial technologies engineering in 1986, and the Ph.D. degree in electronic engineering in 1992 from the Politecnico di Milano, Milan, Italy, and the title of Agrégé de l'Enseignement Supérieur, from ULB, in 1995. From 1992 to 1993, he was a Research Fellow at the International Computer Science Institute, Berkeley, CA. In 1993, he was a NATO-CNR Fellow, and from 1994 to 1996, a Marie Curie Fellow. Since 1996, he has been a tenured Researcher of the FNRS, the Belgian National Funds for Scientific Research, and co-director of IRIDIA, the artificial intelligence laboratory of the ULB. He is the inventor of the ant colony optimization metaheuristic. His current research interests include swarm intelligence, swarm robotics, and metaheuristics for discrete optimization. He is the Editor-in-Chief of Swarm Intelligence, and an Associate Editor or member of the Editorial Boards of many journals on computational intelligence and adaptive systems. Dr. Dorigo is a Fellow of the AAAI, EurAI, and IEEE. He was awarded the Italian Prize for Artificial Intelligence in 1996, the Marie Curie Excellence Award in 2003, the Dr. A. De Leeuw-Damry-Bourlart award in applied sciences in 2005, the Cajastur International Prize for Soft Computing in 2007, an ERC Advanced Grant in 2010, the IEEE Frank Rosenblatt Award in 2015, and the IEEE Evolutionary Computation Pioneer Award, awarded in 2016.