IDEAL 2022 Programme

23rd International Conference on Intelligent Data Engineering and Automated Learning (IDEAL)

The University of Manchester, UK

24-26 November 2022

(Hybrid)

Sponsors:

IEEE Computational Intelligence Society UK & IRELAND

Springer

MANCHESTER 1824

The University of Manchester

Preface

The International Conference on Intelligent Data Engineering and Automated Learning (IDEAL) is an annual international conference dedicated to emerging and challenging topics in intelligent data analytics and associated machine learning paradigms and systems. The conference provides a sample of current trends and a unique and stimulating forum for presenting and discussing the latest theoretical advances and real-world applications.

After last year's virtual event, the 23rd edition, IDEAL 2022, was held in Manchester, UK, during November 24-26 in hybrid mode. Given the uncertainties and many travel difficulties, a hybrid event appeared to be practical and best for the time being, like many other similar conferences.

For the past two decades, IDEAL has served an important role in the data analytics, machine learning and AI communities. The conference aims to bring together researchers and practitioners and to present their latest findings, disseminate state-of-the-art results, and share experiences and forge alliances on tackling many real-world challenging problems. During the difficult and turbulence past two years, IDEAL conference continued to play its roles in these communities. The core themes of the IDEAL 2022 included big data challenges, machine learning, deep learning, data mining, information retrieval and management, bio-/neuro-Informatics, bio-inspired models, agents and hybrid intelligent systems, and real-world applications of intelligence techniques and AI.

In total, 52 papers were accepted and presented at IDEAL 2022, which were selected from nearly 80 submissions. Our Programme Committee did a sterling job in providing timely and useful feedback and peer reviews for all the submissions, with each paper receiving three-blind reviews. In addition to the IDEAL 2022 main track, there were a number of special sessions as listed on the IDEAL 2022 website. We would also like to thank the special sessions chairs Antonio J. Tallón-Ballesteros, Teresa Gonçalves, Vítor Nogueira and Fernando Nuñez Hernandez, and the publicity chairs Bing Li, Guilherme Barreto, Jose A. Costa and Yimin Wen for their great efforts. Our distinguished keynote speakers, Paolo Rosso, Ioannis (Yiannis) Kompatsiaris and Barbara Hammer, were also greatly appreciated for their outstanding lectures.

We would like to thank the IEEE UK & Ireland CIS Chapter for their technical co-sponsorship. We would also like to thank all the people who devoted so much time and effort to the successful running of the conference, in particular the members of the Programme Committee and reviewers, organisers of the Special Sessions, as well as the authors who contributed to the conference.

Finally, we are also very grateful to the hard work by the local organising team at the University of Manchester, especially Yating Huang, and our event management collaborators, Magnifisence, in particular, Lisa Carpenter and Gail Crowe. Continued support, collaboration and sponsorship for the best paper awards from Springer LNCS are also greatly appreciated.

October 2022

Hujun Yin
David Camacho
Peter Tino
Richard Allmendinger
Antonio J. Tallón-Ballesteros
Ke Tang
Sung-Bae Cho
Paulo Novais
Paulo Quaresma

Keynote Speaker

Professor Paolo Rosso

Universitat Politècnica de València

Spain

Google Scholar:
https://scholar.google.es/citations?user=HFKXPH8AAAAJ&hl=en

On the detection of fake news, conspiracy theories, and other harmful information

Abstract: The rise of social media has offered a fast and easy way for the propagation of fake news and conspiracy theories. Despite the research attention that has received, fake news detection remains an open problem and users keep sharing texts that contain false statements. In this keynote I will describe how to go beyond textual information to detect fake news, taking into account also affective and visual information because providing important insights on how fake news spreaders aim at triggering certain emotions in the readers. I will also describe how psycholinguistic patterns and users' personality traits may play an important role in discriminating fake news spreaders from fact checkers. Finally, I will comment on some studies on the propagation of conspiracy theories. The ongoing work done on detection of disinformation, from fake news to conspiracy theories, is in the framework of IBERIFIER, the Iberian media research & fact-checking hub on disinformation funded by the European Digital Media Observatory (2020-EU-IA-0252), and the XAI-DisInfodemics project on eXplainable AI for disinformation and conspiracy detection during infodemics funded by the Spanish Ministry of Science and Innovation (PLEC2021-007681). In the final part of the keynote I will briefly address also the other side of harmful information in social media, hate speech, making emphasis on the case of misogynous memes.

Bio-sketch: Paolo Rosso is Full Professor at the Universitat Politècnica de València, where he is also a member of the Pattern Recognition and Human Language Technology (PRHLT) research center. His research interests are focused on social media data analysis, mainly on fake news and hate speech detection, author profiling, and sarcasm detection. He has published 50+ articles in journals (34 Q1) and 400+ articles in conferences and workshops, he has an H-index of 68 (source: Google Scholar) and he is in the ranking of the top H-index scientists in Spain (http://www.guide2research.com/scientists/ES). He has been PI of several national and international research projects funded by EC, U.S. Army Research Office, Qatar National Research Fund, and Vodafone Spain. Currently, he is the PI of the research project XAI-DisInfodemics on eXplainable AI for disinformation and conspiracy detection during infodemics (Spanish Ministry of Science and Innovation), a member of the EC IBERIFIER project on Monitoring the threats of disinformation (European Digital Media Observatory), the project on Resources and Applications for Detecting and Classifying Polarized Hate Speech in Arabic Social Media (Qatar National Research Fund), and the recent FairTransNLP project on Fairness and Transparency for equitable NLP applications in social media (Spanish Ministry of Science and Innovation). He has been advisor of 26 PhD theses and currently he is the advisor of 8 PhD students. Paolo Rosso gave several keynotes (TSD-2020, CICLing-2019 etc.) and has helped organising 30+ shared tasks at the PAN Lab at CLEF and FIRE evaluation forums, SemEval, IberLEF and Evalita on topics such as author profiling (e.g. profiling bots, haters, and fake news spreaders), hate speech detection, irony detection, misogyny, sexism and toxic language identification. He helped as senior chair or track chair in conferences such as SIGIR, ACL, COLING, EMNLP, just to name a few. Since 2014 he is Deputy Steering Committee Chair of the CLEF Association.

Keynote Speaker

Professor Ioannis (Yiannis) Kompatsiaris

Information Technologies Institute, CERTH,
Greece

Google Scholar:
https://scholar.google.com/citations?user=Nr7smP8AAAAJ&hl=en

Content, Context and Network-based Approaches for Fighting Disinformation

Abstract: Recent developments and events of worldwide significance such as the COVID-19 pandemic and the war in Ukraine have made clear that online disinformation is a long-lasting challenge of immense scale and complexity. Focusing on visual disinformation that can appear in many forms, including manipulated photos/video, deepfakes, visuals out of context and false connections, a variety of approaches and tools are needed in order to address this challenge. In this talk, I will be presenting our lab's efforts in this area, across three main directions: approaches which take into account content, context and network-based information. It will include media forensics, deepfake detection and reverse image and video search approaches together with tools already used by journalists and fact-checkers. Key challenges and additional aspects such as actual operational settings, human behaviour and policy issues will also be covered.

Bio-sketch: Dr. Ioannis (Yiannis) Kompatsiaris is the Director of CERTH-ITI and the Head of Multimedia Knowledge and Social Media Analytics Laboratory. His research interests include AI/ML for Multimedia, Semantics (multimedia ontologies and reasoning), Social Media and Big Data Analytics, Multimodal and Sensors Data Analysis, Human Computer Interfaces, e-Health, Cultural, Media/Journalism and Security applications. He is the co-author of 178 papers in refereed journals, 63 book chapters, 8 patents and 560 papers in international conferences. Since 2001, Dr. Kompatsiaris has participated in 88 National and European research programs, in 31 of which he has been the Project Coordinator. He has also been the PI in 15 contracts from the industry. He has been the co-chair of various international conferences and workshops including the 13th IEEE Image, Video, and Multidimensional Signal Processing (IVMSP 2018) Workshop and has served as a regular reviewer, associate and guest editor for a number of journals and conferences currently being an associate editor of IEEE Transactions on Image Processing. He is a member of the National Ethics and Technoethics Committee, the Scientific Advisory Board of the CHIST-ERA funding programme and an elected member of the IEEE Image, Video and Multidimensional Signal Processing – Technical Committee (IVMSP – TC). He is a Senior Member of IEEE and ACM. Since January 2014, he is a co-founder of the Infalia private company, a high-tech SME focusing on data intensive web services and applications.

Keynote Speaker

Professor Barbara Hammer

Bielefeld University
Germany

Google Scholar: https://scholar.google.es/citations?hl=en&user=1d3OxaUAAAAJ

Trustworthy AI - Attacks, explanations, and lifelong learning

Abstract: The increasing availability of smart products and AI components in everyday life such as speech assistance or image recognition tools has also led to an increase of peculiar outputs and errors of AI models. Examples include adversarial attacks (i.e., misclassifications of AI models which are surprising for humans), biases of models (i.e., models which treat some subgroups differently as compared to others), or functional failures (i.e., models are no longer working as required in realistic scenarios).

After a glimpse at some spectacular AI failures, I will address three approaches which have been proposed in this context:

I) adversarial attacks: what makes an attack adversarial and how can models be efficiently be 'robustified'?

II) explanations of AI models: we focus on efficient and plausible counterfactual explanations and have a glimpse at how to evaluate their effectiveness,

III) lifelong learning: how can humans teach machines and AI models be continuously adapted based on human feedback?

Bio-sketch: Barbara Hammer is a full Professor for Machine Learning at the CITEC Cluster at Bielefeld University, Germany. She received her Ph.D. in Computer Science in 1999 and her venia legendi (permission to teach) in 2003, both from the University of Osnabrueck, Germany, where she was head of an independent research group on the topic 'Learning with Neural Methods on Structured Data'. In 2004, she accepted an offer for a professorship at Clausthal University of Technology, Germany, before moving to Bielefeld in 2010. Barbara's research interests cover theory and algorithms in machine learning and neural networks and their application for technical systems and the life sciences, including explainability, learning with drift, nonlinear dimensionality reduction, recursive models, and learning with non-standard data. Barbara has been chairing the IEEE CIS Technical Committee on Data Mining and Big Data Analytics, the IEEE CIS Technical Committee on Neural Networks, and the IEEE CIS Distinguished Lecturer Committee. She has been elected as member of the IEEE CIS Administrative Committee and the INNS Board. She is an associate editor of the IEEE Computational Intelligence Magazine, the IEEE TNNLS, and IEEE TPAMI. Currently, large parties of her work focusses on explainable machine learning for spatial-temporal data in her role as a PI of the ERC Synergy Grant Water-Futures.

IDEAL 2022 Programme: Overview

Thursday 24th November: Graphene Suite, Pendulum Hotel (Zoom link: TBA)	
09:00-09:15	**Opening (General &PC Chairs)**
09:15-10:00	**Keynote (Paolo Rosso)**
10:00-11:00	Session T1: *Image Analysis and Segmentation (4)* #378, #2117, #5723, #7324
11:00-11:20	Coffee/Tea
11:20-13:05	Session T2: *Biological/Medical/Healthcare Applications (7)* #9151, #8218, #757, #5336, #5037, #5511, #4819
13:05-14:00	Lunch
14:00-15.45	Session T3: *Natural Language Processing and Knowledge Engineering (6)* #725, #1727, ~~#2268,~~ #5577, #6310, #6949
15:45-16:00	Coffee/Tea
16:00-17:00	Session T4: *Deep Learning Models and Applications (4)* #6724, #4010, #8708, #7636

Friday 25th November: Graphene Suite, Pendulum Hotel (Zoom link: TBA)	
09:00-09:45	**Keynote (Yiannis Kompatsiaris)**
09:45-11:00	Session F1: *Time Series and Recurrent Models (5)* #5128, #9976, ~~#6226~~, #8818, #4713, #2268
11:00-11:20	Coffee/Tea
11:20-13:05	Session F2: *Business and Industrial Applications (7)* #4652, #4227, #9101, #1055, #5308, #4408, #7322
13:00-14:00	Lunch
14:00-14:45	**Keynote (Barbara Hammer)**
14:45-16.00	Session F3: *Security and Biometrics (5)* #7630, #8433, #6353, #7104, #1883
16:00-16:20	Coffee/Tea
16:20-17:50	Session F4: *Data Mining, Feature Selection and Classification (6)* #3166, #6592, #6671, #6696, #8286, #2690
19:00-21:30	**Gala Dinner & Awards (Pendulum)**

Saturday 26th November: Online (Zoom link: TBA)	
09:45-10:45	Session S1: *Data Mining and Data Augmentation (3)* #6226, #4856, #6398, #3810
10:45-11:00	Coffee/Tea Break
11:00-12:00	Session S2: Special Sessions (4) Intelligent Techniques for Real-World Applications of Green Renewable Energy and Green Transport (#2067, #3111) Computational Intelligence for Imbalanced Classification (#6722, #7380)
12:00-12:05	**Closing (General & PC Chairs)**
12:10-	**Walk Tour (meet at Pendulum Hotel front)**

IDEAL2022 Programme: Detailed

Thursday 24th November

OPENING (09:00-09:15)

KEYNOTE 1 (09:15-10:00): *On the detection of fake news, conspiracy theories, and other harmful information*, by Paolo Rosso, Chair: David Camacho

T1 (10:00-11:00) Image Analysis and Segmentation
Chair: Richard Allmendinger

Ensemble Stack Architecture for Lungs Segmentation from X-ray Images	Asifuzzaman Lasker, Mridul Ghosh, Sk Md Obaidullah, Chandan Chakraborty, Teresa Goncalves and Kaushik Roy
Federating Unlabeled Samples: A Semi-Supervised Collaborative framework for Whole Slide Image Analysis	Laëtitia Launet, Rocío del Amor, Adrián Colomer, Andrés Mosquera-Zamudio, Anaïs Moscardó, Carlos Monteagudo, Zhiming Zhao and Valery Naranjo
How Image Retrieval and Matching can improve object localisation on offshore platforms	Youcef Djenouri, Jon Hjelmervik, Elias Bjorne and Milad Mobarhan
Res-GAN: Residual Generative Adversarial Network for Coronary Artery Segmentation	Rawaa Hamdi, Asma Kerkeni, Mohamed Hedi Bedoui and Asma Ben Abdallah

Coffee/Tea (11:00-11:20)

T2 (11:20-13:05): Biological/Medical/Healthcare Applications
Chair: Sung-bae Cho

Challenging mitosis detection algorithms: Global labels allow centroid localization	Claudio Fernandez-Martín, Umay Kiraz, Julio Silva-Rodríguez, Sandra Morales, Emiel Janssen and Valery Naranjo
Guide-Guard: Off-Target Predicting in CRISPR Applications	Joseph Bingham, Netanel Arussy and Saman Zonouz
Characterizing cardiovascular risk through unsupervised and interpretable techniques	Hugo Calero Díaz, David Chushig-Muzo and Cristina Soguero-Ruiz
A Simulation Model for Predicting the Spread of COVID-19 Virus	Piotr Jastrzębski, Barbara Jagielska, Mateusz Kolasa, Izabela Rejer and Maciej Gabryś
The Covid-19 influence on the desire to Stay At Home: A Big Data Architecture	Regina Sousa, Daniela Oliveira, Hugo Peixoto and José Machado
ICU Mortality Prediction using Long Short-Term Memory Networks	Manel Mili, Asma Kerkeni, Mohamed Hedi Bedoui and Asma Ben Abdallah
Towards a low-cost companion Robot for helping elderly well-being	Jaime Andres Rincon Arango, Cedric Marco-Detchart, Vicente Javier Julian Inglada, Carlos Carrascosa Casamayor and Paulo Novais

Lunch (13:05-14:00)

T3 (14:00-15:45): Natural Language Processing & Knowledge Engineering
Chair: Dalila Duraes

Synonym-Based Essay Generation and Augmentation for Robust Automatic Essay Scoring	Tsegaye Misikir Tashu and Tomas Horvath
Detection of false information in Spanish using machine learning techniques	Arsenii Tretiakov, Alejandro Martín and David Camacho
Intelligent Learning Rate Distribution to reduce Catastrophic Forgetting in Transformers	Philip Kenneweg, Alexander Schulz, Sarah Schröder and Barbara Hammer

Generating a Portuguese-European BERT based model using content from Arquivo.pt archive	Nuno Miquelina, Paulo Quaresma and Vitor B. Nogueira
Gradient Regularization with Multivariate Distribution of Previous Knowledge for Continual Learning	Tae-Heon Kim, Hyung-Jun Moon and Sung-Bae Cho

Coffee/Tea (15:45-16:00)

T4 (16:00-17:00) Deep Learning Models and Applications
Chair: Matilde Santos

Performance/Resources Comparison of Hardware Implementations on Fully Connected Network Inference	Randy Lozada, Jorge Ruiz, Manuel Luis González, Javier Sedano, José Ramón Villar, Ángel Miguel Garcia-Vico and Erik Sebastian Skibinsky Gitlin
Deep Learning Based Predictive Analytics for Decentralized Content Caching in Hierarchical Edge Networks	Dhruba Chakraborty, Mahima Rabbi, Maisha Hossain, Saraf Noor Khaled, Maria Khanom Oishi and Dr. Md. Golam Rabiul Alam
Effective Prevention of Semantic Drift in Continual Deep Learning	Khouloud Saadi and Muhammad Taimoor Khan
Randomized K-FACs: Speeding up K-FAC with Randomized Numerical Linear Algebra	Constantin Octavian Puiu

Friday 25th November

KEYNOTE 2 (09:00-09:45): *Content, context and network-based approaches for fighting disinformation*, by Ioannis (Yiannis) Kompatsiaris, Chair: David Camacho

F1 (09:45-11:00): Time Series and Recurrent Models
Chair: Peter Tino

Distance-based Delays in Echo State Networks	Stefan Iacob, Matthias Freiberger and Joni Dambre
Go-around prediction in non-stabilized approach scenarios through a regression deep learning model trained from pilots' expertise	Jesús Cantero, Adrián Colomer, Alexandre Duchevet, Théo De La Hogue, Jean-Paul Imbert and Valery Naranjo
A Sequence to Sequence Long Short-Term Memory Network for Footwear Sales Forecasting	Luis Santos, Luis Miguel Matos, Luis Ferreira, Pedro Alves, Mário Viana, André Pilastri and Paulo Cortez
Duplication Scheduling with Bottom-Up Top-Down Recursive Neural Network	Vahab Samandi, Peter Tino and Rami Bahsoon
Automatic Exploration of Domain Knowledge in Healthcare	Tiago Afonso and Claudia Antunes

Coffee/Tea (11:00-11:20)

F2 (11:20-13:05): Business and Industrial Applications
Chair: Hujun Yin

Endowing Intelligent Vehicles with the Ability to Learn User's Habits and Preferences with Machine Learning Methods	Paulo Barbosa, Flora Ferreira, Carlos Fernandes, Wolfram Erlhagen, Pedro Guimarães, Weronika Wojtak, Sérgio Monteiro and Estela Bicho
Explanations of performance differences in segment lining for tunnel boring machines	Hans Aoyang Zhou, Aymen Gannouni, Tala Bazazo, Johannes Tröndle, Anas Abdelrazeq and Frank Hees
EfficientNet Architecture Family Analysis on Railway Track Defects	Jon Rengel, Matilde Santos and Ravi Pandit

Identification of Sedimentary Strata by Segmentation Neural Networks of Oblique Photogrammetry of UAVs	Daniel Theisges dos Santos, Mauro Roisenberg and Marivaldo dos Santos Nascimento
EduBot: A Proof-of-Concept for a High School Motivational Agent	Hugo Faria, Maria Araujo Barbosa, Bruno Veloso, Francisco S. Marcondes, Celso Lima, Dalila Durães and Paulo Novais
An Intelligent Decision Support System for Road Freight Transport	Hugo Silva Carvalho, André Pilastri, Luis Miguel Matos and Paulo Cortez
Using design of experiments to support the commissioning of industrial assembly processes	Tim Voigt, Marvin Schöne, Martin Kohlhase, Oliver Nelles, Martin Kuhn
Lunch (13:05-14:00)	
KEYNOTE 3 (14:00-14:45): *Trustworthy AI - Attacks, explanations, and lifelong learning*, by Barbara Hammer, Chair: Hujun Yin	
F3 (14:45-16:00): Security and Biometrics Chair: Paulo Novais	
Using GANs to improve the accuracy of machine learning models for malware detection	Ciprian-Alin Simion, Gheorghe Balan and Dragos Teodor Gavrilut
A Comparative Study of LAD, CNN and DNN for Detecting Intrusions	Sneha Chauhan, Loreen Mahmoud, Sugata Gangopadhyay and Aditi Kar Gangopadhyay
A Vision Transformer Enhanced with Patch Encoding for Malware Classification	Kyoung Won Park and Sung Bae Cho
Face ReID method via Deep Learning	Yves Augusto Lima Romero and Ajalmar Rêgo da Rocha Neto
An approach to authenticity speech validation through facial recognition and artificial intelligence techniques	Hugo Faria, Manuel Rodrigues and Paulo Novais
Coffee/Tea (15:45-16:00)	
F4 (16:00-17:50): Data Mining, Feature Selection and Classification Chair: TBA	
A Binary Water Flow Optimizer Appplied For Feature Selection	Fagner José de Matos Macêdo and Ajalmar Rêgo da Rocha Neto
Explainable Artificial Intelligence for Improved Modeling of Processes	Riza Velioglu, Jan Philip Göpfert, Barbara Hammer and André Artelt
Efficient Sensor Selection for Individualized Prediction Based on Biosignals	Markus Vieth, Nils Grimmelsmann, Axel Schneider and Barbara Hammer
Understanding the classes better with class-specific and rule-specific feature selection, and redundancy control in a fuzzy rule based framework	Suchismita Das and Nikhil Pal
Topological Analysis of Credit Data: Preliminary Findings	James Cooper, Peter Mitic, Gesine Reinert and Tadas Temcinas
On Studying the Effect of Data Quality on Classification Performance	Roxane Jouseau, Sébastien Salva and Chafik Samir
Gala Dinner & Awards (19:00-21:30)	

Saturday 26th November	
S1 (09:45-10:45): Data Mining and Data Augmentation Chair: Ke Tang	
Ethereum investment based on LSTM and GRU forecast	Adrián Viéitez Mariño, Matilde Santos Peñas and Rodrigo Naranjo
Zero-shot Knowledge Graph Completion for Recommendation System	Zhiyuan Wang, Cheng Chen and Ke Tang
Association Rules Mining for reducing items from Emotion Regulation Questionnaires	Rihab Khadimallah, Ilhem Kallel and Fadoua Drira
Benchmarking Data Augmentation Techniques for Tabular Data	Pedro Machado, Bruno Fernandes and Paulo Novais
Coffee/Tea break (10:45-11:00)	
S2 (11:00-12:00): Special Sessions	
Special Session on Intelligent Techniques for Real-World Applications of Green Renewable Energy and Green Transport Chairs: Matilde Santos and J. Enrique Sierra-Garcıa	
Identification of Variables of a Floating Wind Turbine Prototype	Juan Tecedor Roa, Carlos Serrano, Matilde Santos and J. Enrique Sierra-Garcıa
Dynamic Optimization of Energy Hubs with Evolutionary Algorithms Using Adaptive Time Segments and Varying Resolution	Rafael Poppenborg, Hatem Khalloof, Malte Chlosta, Tim Hofferberth, Clemens Düpmeier and Veit Hagenmeyer
Special Session on Computational Intelligence for Imbalanced Classification Chairs: Wenbin Pei	
Solving multi-class imbalance problems using improved tabular GANs	Zakarya Farou, Liudmila Kopeikina and Tomas Horvath
Convolutional Neural Network Approach for Multiple Sclerosis Lesion Segmentation	Nada Haj Messaoud, Asma Mansour, Rim Ayari, Asma Ben Abdallah, Mouna Aissi, Mahbouba Frih and Mohamed Hedi Bedoui
Closing (12:00-12:05)	
Walk Tour (12:10-14:00)	

Zoom links:

Thursday AM: https://zoom.us/j/95993523031

Thursday PM: https://zoom.us/j/97406064145

Friday AM: https://zoom.us/j/93780699855

Friday PM: https://zoom.us/j/94419933442

Saturday AM: https://zoom.us/j/97765877360