ICANN 2019 Scientific Program



28th International Conference on Artificial Neural Networks

Munich, Germany September 17-19, 2019



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Police 110 Fire Brigade 112Emergency Medical Services 112Patient Ambulance +49(0)89-19222Poison Emergency Services +49(0)89-19240

Contacts of Local Conference Organisers

Dr. Igor Tetko +49(0)1779187323, also Viber and Telegram Dr. Pavel Karpov +49(0)15171585728, also Telegram Zhonghua Xia +49(0)15226369972 SKYPE: icann2019 v



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How to get to ICANN 2019 ICANN 2019 Conference Venue

Klinikum rechts der Isar Technische Universität München Einsteinstr. 5 81675 Munich – Germany



How to reach the conference venue:

From the airport (München Flughafen) By taxi: A taxi from Munich airport to the conference venue costs around 70-90 \in and takes 45 minutes.

By train (S-bahn): We recommend taking the S-Bahn line S8 (direction München /Herrsching) to Ostbahnhof (10 stops). Then, change to the underground U-Bahn line U5 and get off in Max-Weber-Platz station (1 stop). To reach the conference venue, follow the signs "Einsteinstraße". The one-way trip costs 11,60 \in and takes around 50-60 minutes. We suggest to buy daily card (Gesamtnetz) which will allow unrestricted travel in all Munich area from the moment of validation until 6 am on the next day. For 24,30 \in you can also buy a Gesamtnetz card valid up to 5 people. See other tickets at https://www.mvv-muenchen.de.

From Munich main train station (München Hauptbahnhof) Take the underground (U-Bahn) line U5 (direction Neuperlach Süd) or U4 (direction Arabellapark) to "Max-Weber-Platz" station (4 stops). Follow the signs "Einsteinstraße". A single ticket costs $2,90 \in$.

Every participant receives a "3-days Inner District (3-Tageskarten Innenraum)". The card is valid from the moment of validation until 6 am on the fourth day. Please, notice that this card will not cover your trip to the airport. Inner District encompasses the urban area of Munich and some municipalities outside of Munich.

The poster program may change!





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Tuesday, 17 September 2019

08:00-09:00 Conference Registration

Registration of the participants and Poster mounting. The list with Posters' titles for this day is available on the page 29. They correspond to the first two volumes of the Proceedings, namely:

- 1. Theoretical Neural Computation (ISBN 978-3-030-30486-7)
- 2. Deep Learning (ISBN 978-3-030-30483-6).

09:00-11:00 Parallel Sessions in Lecture Halls A, B, and C

Object detection (Lecture Hall A)

Session Chair: João Paulo Papa

09:00-09:20 COCO-TS Dataset: Pixel-level Annotations Based on Weak Supervision for Scene Text Segmentation *Simone Bonechi, Paolo Andreini, Monica Bianchini, Franco Scarselli* (303)

09:20-09:40 A Study of Deep Learning for Network Traffic Data Forecasting *Benedikt Pfülb, Christoph Hardegen, Alexander Gepperth, Sebastian Rieger* (349)

09:40-10:00 A mixture-of-experts model for vehicle prediction using an online learning approach *Florian Mirus, Terrence C. Stewart, Chris Eliasmith, Jörg Conradt* (169)

10:00-10:20 Learning Deep Structured Multi-Scale Features for crisp and occlusion edge detection *Zihao Dong* (043)

10:20-10:40 Aggregating Rich Deep Semantic Features for Fine-Grained Place Classification *TingYu Wei, Wenxin Hu, Xingjiao Wu, Yingbin Zheng, Hao Ye, Jing Yang, Liang He* (021)

Anomaly Detection (Lecture Hall B)

Session Chair: Jan Faigl

09:00-09:20 Physical Adversarial Attacks by Projecting Perturbations *Nils Worzyk, Hendrik Kahlen, Oliver Kramer* (114)

09:20-09:40 Unsupervised anomaly detection using optimal transport for predictive maintenance *Amina Alaoui Belghiti, Sylvain Chevallier, Eric Monacelli* (170)

09:40-10:00 Recovering Localized Adversarial Attacks *Jan Philip Göpfert, Heiko Wersing, Barbara Hammer* (318)

10:00-10:20 Evaluating Defensive Distillation For Defending Text Processing Neural Networks Against Adversarial Examples *Marcus Soll, Tobias Hinz, Sven Magg, Stefan Wermter* (334)

10:20-10:40 Distortion Estimation Through Explicit Modeling of the Refractive Surface *Szabolcs Pável, Csanad Sandor, Lehel Csato* (079)

10:40-11:00 Change Detection in Satellite Images using Reconstruction Errors of Joint Autoencoders *Ekaterina Kalinicheva, Jérémie Sublime, Maria Trocan* (080)

Brain and neural science (Lecture Hall C)

Session Chair: Alessandra Lintas

09:00-09:20 Robust Optimal-Size Implementation of Finite State Automa-ta with Synfire Ring-Based Neural Networks *Jérémie Cabessa, Jiri Sima* (160)

09:20-09:40 A Neural Circuit Model of Adaptive Robust Tracking Control for Continuous-Time Nonlinear Systems *Pavlo Tymoshchuk* (243)

09:40-10:00 Model-Agnostic Explanations for Decisions using Minimal Patterns *Kohei Asano, Jinhee Chun, Atsushi Koike, Takeshi Tokuyama* (030)

10:00-10:20 A Nonlinear Fokker-Planck Description of Continuous Neural Network Dynamics *Roseli Wedemann, Angel Ricardo Plastino* (388)

10:20-10:40 Scaffolding Haptic Attention with Controller Gating *Alexandra Moringen, Sascha Fleer, Helge Ritter* (409)

10:40-11:00 Ensemble of Convolutional Neural Networks for P300 Speller in Brain Computer Interface *Hongchang Shan, Yu Liu, Todor Stefanov* (459)

11:00-11:30 Coffee Break and Posters Presentations

The list with Posters' titles for this day is available on the page 29.

11:30-12:15 Keynote Talk: Machine learning and AI for the sciences – towards understanding *by Klaus-Rober Müller*

Session Chair: Patrick van der Smagt

In recent years machine learning (ML) and Artificial Intelligence (AI) methods have begun to play a more and more enabling role in the sciences and in industry. In particular, the advent of large and/or complex data corpora has given rise to new technological challenges and possibilities.

The talk will connect two topics (1) explainable AI (XAI) and (2) ML applications in sciences (e.g. Medicine and Quantum Chemistry) for gaining new insight. Specifically I will first introduce XAI methods (such as LRP) that are now readily available and allow for an understanding of the inner workings of nonlinear ML methods ranging from kernel methods to deep learning methods including LSTMs. In particular XAI allows unmasking clever Hans predictors. Then, ML for Quantum Chemistry is discussed, showing that ML methods can lead to highly useful predictors of quantum mechanical properties of molecules (and materials) reaching quantum chemical accuracies both across chemical compound space and in molecular dynamics simulations. Notably, these ML models do not only speed up computation by several orders of magnitude but can give rise to novel chemical insight. Finally, I will analyze morphological and molecular data for cancer diagnosis, also here highly interesting novel insights can be obtained.

Note that while XAI is used for gaining a better understanding in the sciences, the introduced XAI techniques are readily useful in other application domains and industry as well.

12:15-13:30 Lunch Buffet and Posters Presentations

The list with Posters' titles for this day is available on the page 29.

13:30-15:30 Parallel Sessions in Lecture Halls A, B, and C

Time Series (Lecture Hall A)

Session Chair: Antonio Javier Pons Rivero

13:30-13:50 Timage – A Robust Time Series Classification Pipeline *Marc Wenninger, Sebastian Bayerl, Jochen Schmidt, Korbinian Riedhammer* (148)

13:50-14:10 Neural field model for measuring and reproducing time intervals *Weronika Wojtak, Flora Ferreira, Estela Bicho, Wolfram Erlhagen* (157)

14:10-14:30 Routine Modeling with Time Series Metric Learning *Paul Compagnon, Grégoire Lefebvre, Stefan Duffner, Christophe Garcia* (214)

14:30-14:50 Auto-Lag Networks for Real Valued Sequence to Sequence Prediction *Gilles Madi Wamba, Nicolas Gaude* (023)

14:50-15:10 DeepEX: Bridging the Gap Between Knowledge and Data Driven Techniques for Time Series Forecasting *Muhammad Ali Chattha, Shoaib Ahmed Siddiqui, Mohsin Munir, Ludger Van Elst, Imran Malik, Andreas Dengel, Sheraz Ahmed* (499)

15:10-15:30 NARPCA: Neural Accumulate-Retract PCA for Low-latency Highthroughput Processing on Datastreams *Cristian Axenie, Radu Tudoran, Stefano Bortoli, Mohamad Al Hajj Hassan, Götz Brasche* (053)

Informed and Explainable Methods (Lecture Hall B)

Session Chair: Rafet Sifa

13:30-13:50 Reinforcement learning informed by optimal control *Magnus Önnheim, Pontus Andersson, Emil Gustavsson, Mats Jirstrand* (340)

13:50-14:10 Explainable Anomaly Detection via Feature-Based Localization *Shogo Kitamura, Yuichi Nonaka* (363)

14:10-14:30 DeepMimic: Mentor-Student Unlabeled Data Based Training *Itay Mosafi, Eli (Omid) David, Nathan Netanyahu* (493)

14:30-14:50 Evaluation of tag clusterings for user profiling in movie recommendation *Guglielmo Faggioli, Mirko Polato, Ivano Lauriola, Fabio Aiolli* (528)

14:50-15:10 On Chow-Liu forest based regularization of deep belief networks *Alex Sarishvili, Andreas Wirsen, Mats Jirstrand* (071)

15:10-15:30 Prototypes within Minimum Enclosing Balls *Christian Bauckhage, Rafet Sifa, Tiansi Dong* (075)

Learning and optimization (Lecture Hall C)

Session Chair: Roseli Wedemann

13:30-13:50 Comparison between Filter Criteria for Feature Selection in Regression *Alexandra Degeest, Michel Verleysen, Benoit Frenay* (284)

13:50-14:10 Dynamically Sacrificing Accuracy for Reduced Computation: Cascaded Inference Based on Softmax Confidence *Konstantin Berestizshevsky, Guy Even* (328)

14:10-14:30 Adaptive-L2 Batch Neural Gas *Nico Cavalcanti, Marcelo Ferreira, Francisco de Assis Tenorio de Carvalho* (416)

14:30-14:50 Non-Convergence and Limit Cycles in the Adam Optimizer *Sebastian Bock, Martin Georg Weiß* (439)

14:50-15:10 Autonoumous Learning Paradigm for Spiking Neural Networks *Junxiu Liu, Liam McDaid, Jim Harkin, Shvan Karim, Anju Johnson, David Halliday, Andy Tyrrell, Jon Timmis, Alan Millard, James Hilder* (460)

15:10-15:30 Using feature entropy to guide filter pruning for efficient convolutional networks *Yun Li, Luyang Wang, Sifan Peng, Aakash Kumar, Baoqun Yin* (087)

15:30-16:00 Coffee Break and Posters Presentations

The list with Posters' titles for this day is available on the page 29.

16:00-18:00 Parallel Sessions in Lecture Halls A, B, and C

Object detection (Lecture Hall A)

Session Chair: Sebastian Otte

16:00-16:20 NatCSNN: A Convolutional Spiking Neural Network for recognition of objects extracted from natural images *Pedro Machado, Georgina Cosma, Martin McGinnity* (256)

16:20-16:40 Improving Reliability of Object Detection for Lunar Craters using Monte Carlo Dropout *Tomoyuki Myojin, Shintaro Hashimoto, Kenji Mori, Keisuke Sugawara, Naoki Ishihama* (032)

16:40-17:00 Recurrent Connections Aid Occluded Object Recognition by Discounting Occluders *Markus Roland Ernst, Jochen Triesch, Thomas Burwick*

(386)

17:00-17:20 Action unit assisted Facial Expression Recognition *Fangjun Wang, Liping Shen* (041)

Spiking and Capsule Networks (Lecture Hall B)

Session Chair: Jérémie Cabessa

16:00-16:20 UAV Detection: A STDP trained Deep Convolutional Spiking Neural Network Retina-Neuromorphic Approach *Paul Kirkland, Gaetano Di Caterina, John Soraghan, Yiannis Andreopoulos, George Matich* (429)

16:20-16:40 The Importance of Self-excitation in Spiking Neural Networks Evolved to Recognize Temporal Patterns *Muhammad Yaqoob, Vol-ker Steuber, Borys Wrobel* (495)

16:40-17:00 Capsule Generative Models Yifeng Li, Xiaodan Zhu (150)

17:00-17:20 Advanced Capsule Networks via Context Awareness *Phong Nguyen Huu, Bernardete Ribeiro* (151)

17:20-17:40 Multi-objective Spiking Neural Network Hardware Mapping Based on Immune Genetic Algorithm *Junxiu Liu, Xingyue Huang, Yong-chuang Huang, Yuling Luo, Su Yang* (486)

Augmentation and continual learning (Lecture Hall C)

Session Chair: Alexander Gepperth

16:00-16:20 Predictive Uncertainty Estimation with Temporal Convolutional Networks for Dynamic Evolutionary Optimization *Almuth Meier, Oliver Kramer* (205)

16:20-16:40 Active Learning for Image Recognition using a Visualization-Based User Interface *Christian Limberg, Kathrin Krieger, Heiko Wersing, Helge Ritter* (462)

16:40-17:00 Embedding Complexity of Learned Representations in Neural Networks *Tomáš Kuzma, Igor Farkas* (496)

17:00-17:20 Playing the Large Margin Preference Game *Mirko Polato, Gug-lielmo Faggioli, Ivano Lauriola, Fabio Aiolli* (506)

17:20-17:40 Automatic Augmentation by Hill Climbing *Ricardo Cruz, Joaquim Costa, Jaime Cardoso* (083)

17:40-18:00 Hierarchical Reinforcement Learning with Unlimited Recursive Sub-

routine Calls Yuuji Ichisugi, Naoto Takahashi, Hidemoto Nakada, Takashi Sano (027)

18:00-20:00 Welcome Dinner and Posters Presentations

The list with Posters' titles for this day is available on the page 29. They correspond to the first two volumes of the Proceedings published by Springer.

Wednesday, 18 September 2019

08:30-09:00 Conference Registration

Poster mounting. The list with Posters' titles for this day is available on the page 33. They correspond to the III and IV volumes of the Proceedings, namely:

- 1. Image Processing (ISBN 978-3-030-30507-9)
- 2. Text and Time Series (ISBN 978-3-030-30489-8).

09:00-09:45 John Taylor Memorial Lecture: Recurrent patterns of brain activity associated with cognitive tasks and attractor dynamics *by Alessandro Villa*

Session Chair: Věra Kůrková and Igor Tetko

The simultaneous recording of the time series formed by the sequences of neuronal discharges reveals important features of the dynamics of information processing in the brain. Experimental evidence of firing sequences with a precision of a few milliseconds have been observed in the brain of behaving animals. We review some critical findings showing that this activity is likely to be associated with higher order neural (mental) processes, such as predictive guesses of a coming stimulus in a complex sensorimotor discrimination task, in primates as well as in rats. We discuss some models of evolvable neural networks and their nonlinear deterministic dynamics and how such complex spatiotemporal patterns of firing may emerge. The attractors of such networks correspond precisely to the cycles in the graphs of their corresponding automata, and can thus be computed explicitly and exhaustively. We investigate further the effects of network topology on the dynamical activity of hierarchically organized networks of simulated spiking neurons. We describe how the activation and the biologicallyinspired processes of plasticity on the network shape its topology using invariants based on algebro-topological constructions. General features of a brain theory based on these results is presented for discussion.

09:45-10:30 Keynote Talk: Unsupervised Learning: Passive and Active by Jürgen Schmidhuber

Session Chair: Věra Kůrková and Igor Tetko

I'll start with a concept of 1990 that has become popular: unsupervised learning without a teacher through two adversarial neural networks (NNs) that duel in a minimax game, where one NN minimizes the objective function maximized by the other. The first NN generates data through its output actions, the second NN predicts the data. The second NN minimizes its error, thus becoming a better predictor. But it is a zero sum game: the first NN tries to find actions that maximize the error of the second NN. The system exhibits what I called "artificial curiosity" because the first NN is motivated to invent actions that yield data that the second NN still finds surprising, until the data becomes familiar and eventually boring. A similar adversarial zero sum game was used for another unsupervised method called "predictability minimization." where two NNs fight each other to discover a disentangled code of the incoming data (since 1991), remarkably similar to codes found in biological brains. I'll also discuss passive unsupervised learning through predictive coding of an agent's observation stream (since 1991) to overcome the fundamental deep learning problem through data compression. I'll offer thoughts as to why most current commercial applications don't use unsupervised learning, and whether that will change in the future.

10:30-11:00 Coffee Break and Posters Presentations

The list with Posters' titles for this day is available on the page 33.

11:00-12:00 ENNS General Assembly

12:00-13:30 Lunch Buffet and Posters Presentations

13:30-14:15 Keynote Talk: Large-scale lineage and latent-space learning in single-cell genomic *by Fabian Theis*

Session Chair: Alessandro E. P. Villa

Accurately modeling single cell state changes e.g. during differentiation or in response to perturbations is a central goal of computational biology. Single-cell technologies now give us easy and large-scale access to state observations on the transcriptomic and more recently also epigenomic level, separately for each

single cell. In particular they allow resolving potential heterogeneities due to asynchronicity of differentiating or responding cells, and profiles across multiple conditions such as time points and replicates are being generated.

Typical questions asked to such data are how cells develop over time and after perturbation such as disease. The statistical tools to address these questions are techniques from pseudo-temporal ordering and lineage estimation, or more broadly latent space learning. In this talk I will give a short review of such approaches, in particular focusing on recent extensions towards large-scale data integration using single-cell graph mapping or neural networks, and finish with a perspective towards learning perturbations using variational autoencoders.

14:15-16:15 Selected Talks (Lecture Hall A)

Session Chair: Fabian Theis

14:15-14:35 Probabilistic Bounds for Approximation by Neural Networks *Věra Kůrková* (524)

14:35-14:55 Post-synaptic potential regularization has potential *Enzo Tartaglione, Daniele Perlo, Marco Grangetto* (204)

14:55-15:15 Neural Poetry: Learning to Generate Poems using Syllables *Andrea Zugarini, Stefano Melacci, Marco Maggini* (324)

15:15-15:35 Distinguishing Violinists and Pianists based on their Brain Signals *Gianpaolo Coro, Giulio Masetti, Philipp Bonhoeffer, Michael Betcher* (385)

15:35-15:55 NeuroPower: Designing Energy Efficient Convolutional Neural Network Architecture for Embedded Systems *Mohammad Loni, Ali Zoljodi, Sima Sinaei, Masoud Daneshtalab, Mikael Sjödin* (473)

15:55-16:15 Automatic Estimation of Dog Age: The DogAge Dataset and Challenge Anna Zamansky, Aleksandr Sinitca, Dmitrii Kaplun, Luisa M.L. Dutra, Robert J. Young (514)

16:15-17:00 Coffee Break and Posters Presentations

The list with Posters' titles for this day is available on the page 33.

17:30-23:45 City Tour and Dinner

City Tour is provided by Weis(s)er Stadtvogel GmbH

Meeting Point: 17:30 at Odeonsplatz (U3/4/5/6) in front of Feldherrnhalle (Residentstraße 1)

End of Tour: 19:00 Restaurant **Augustiner Großgaststätten**, Neuhauser Str. 27, 80331 München

www.augustiner-restaurant.com

Thursday, 19 September 2019

08:30-09:00 Conference Registration

Posters mounting. The list with Posters' titles for this day is available on the page 37. They correspond to the V volume of the Proceedings, namely: Workshop and Special sessions (ISBN 978-3-030-30492-8) and several Online posters from other days.

09:00-11:00 Parallel sessions in Lecture Halls A, B, Pavillon, and Conference Room 1

Architecture optimization (Lecture Hall A)

Session Chair: François Blayo

09:00-09:20 Gradient-Based Learning of Compositional Dynamics with Modular RNNs *Sebastian Otte, Patricia Rubisch, Martin Butz* (292)

09:20-09:40 Architecture-aware Bayesian Optimization for Neural Network Tuning *Anders Sjöberg, Magnus Önnheim, Emil Gustavsson, Mats Jirstrand* (422)

09:40-10:00 On the Bounds of Function Approximations Adrian de Wynter (56)

10:00-10:20 A Novel Neural Network-based Symbolic Regression Method: Neuro-Encoded Expression Programming *Aftab Anjum, Fengyang Sun, Lin Wang, Jeff Orchard* (327)

10:20-10:40 Controlling Model Complexity in Probabilistic Model-Based Dynamic Optimization of Neural Network Structures *Shota Saito, Shinichi Shirakawa* (451)

10:40-11:00 An Efficient 3D-NAS Method for Video-based Gesture Recognition *Ziheng Guo, Yang Chen, Wei Huang, Junhao Zhang* (128)

Graph Approaches (Lecture Hall B)

Session Chair: Fragkiskos Malliaros

09:00-09:20 Graph Classification with 2D Convolutional Neural Networks *Antoine Tixier, Giannis Nikolentzos, Polykarpos Meladianos, Michalis Vazirgiannis* (146)

09:20-09:40 Hypernetwork Knowledge Graph Embeddings *Ivana Balazevic, Carl Allen, Timothy Hospedales* (38)

09:40-10:00 Graph Convolutional Networks Improve the Prediction of Cancer Driver Genes *Roman Schulte-Sasse, Stefan Budach, Denes Hnisz, Annalisa Marsico* (380)

10:00-10:20 CNN-Based Semantic Change Detection in Satellite Imagery *Ananya Gupta, Elisabeth Welburn, Simon Watson, Hujun Yin* (408)

10:20-10:40 Axiomatic Kernels on Graphs for Support Vector Machines *Marcin Orchel, Johan Suykens* (438)

Workshop on Reservoir Computing (Pavillon)

Session Chair: Claudio Gallicchio

09:00-09:50 Invited Talk: Bringing Reservoirs Up to Speed for Deep Learning by *W. Maass*

Reservoirs are good at temporal processing and easy to train. They are suitable for temporal processing because they employ a recurrent neural network or some other type of dynamical system. They are easy to train, since they only adapt linear readouts from this dynamical system for a specific task, rather than tackling the more difficult problem of training the recurrent network itself. They also appear to be more plausible as models for brain processing than many models that arise in deep learning.

In deep learning and modern learning-driven AI one rarely uses reservoirs for tasks that have a temporal dimension because their performance is sub-optimal. Instead, one relies on recurrent network of LSTM (Long-Short Term Memory) units that are trained by backpropagation through time (BPTT). In addition, one applies Learning-to-Learn (L2L) methods in order to enable networks to learn from few examples.

I will discuss recent progress in narrowing the performance gap between reservoir computing and deep learning for the case of spike-based reservoirs.

09:50-10:10 Efficient Cross-Validation of Echo State Networks *Mantas Lukoševičius, Arnas Uselis* (529)

10.10-10:30 A Reservoir Computing Framework for Continuous Gesture Recognition *Stephan Tietz, Doreen Jirak, Stefan Wermter* (140)

10.30-10:50 Echo State Networks for Named Entity Recognition *Rajkumar Ramamurthy, Robin Stenzel, Rafet Sifa, Anna Ladi, Christian Bauckhage* (440)

10:50-11:00 Poster spotlight

Artificial Intelligence in Medicine (Conference Room 1)

Session Chair: Nagres Ahmidi, Carsten Marr, and Tingying Pend

09:00-09:40 Invited talk: Towards Deep Federated Learning in Healthcare by Shadi Albarqouni

Deep Learning (DL) has emerged as a leading technology in computer science for accomplishing many challenging tasks. This technology shows an outstanding performance in a broad range of computer vision and medical applications. However, this success comes at the cost of collecting and processing a massive amount of data, which are in healthcare often inaccessible due to privacy issues. Federated Learning is a new technology that allows training DL models without sharing the data. Using Federated Learning, DL models at local hospitals share only the trained parameters with a centralized DL model, which is, in return, responsible for updating the local DL models as well. Yet, a couple of well-known challenges in the medical imaging community, e.g., heterogeneity, domain shift, scarify of labeled data and handling multi-modal data, might hinder the utilization of Federated Learning. In this talk, a couple of proposed methods, to tackle the challenges above, will be presented paving the way to researchers to integrate such methods into the privacy-preserved federated learning.

09:40-10:00 Deep Text Prior: Weakly Supervised Learning for Assertion Classification *Vadim Liventsev, Irina Fedulova, Dmitry Dylov* (216)

10:00-10:20 Investigation of EEG-based Graph-theoretic Analysis for Automatic Diagnosis of Alcohol Use Disorder *Wajid Mumtaz, Lukas Vareka, Roman Mouček* (031)

10:20-10:40 Breast Cancer Classification on Histopathological Images Affected by Data Imbalance Using Active Learning and Deep Convolutional Neural Network *Bogdan Kwolek, Michal Koziarski, Andrzej Bukala, Zbigniew Antosz, Boguslaw Olborski, Pawel Wasowicz, Jakub Swadzba, Boguslaw Cyganek* (353)

10:40-11:00 Random drop loss for tiny object segmentation: Application to lesion segmentation in fundus images *Song Guo, Tao Li, Chan Zhang, Ning Li, Hong Kang, Kai Wang* (183)

11:00-11:30 Coffee Break and Posters Presentations

The list with Posters' titles for this day is available on the page 37.

11:30-12:15 Keynote Talk: The gentle robot *by Sami Haddadin* in Lecture Hall A

Session Chair: Günter Palm

Enabling robots for interaction with humans and unknown environments has been one of the primary goals of robotics research over decades. I will outline how human-centered robot design, nonlinear soft-robotics control inspired by human neuromechanics and physics grounded learning algorithms will let robots become a commodity in our near-future society. In particular, compliant and energy-controlled ultra-lightweight systems capable of complex collision handling enable high-performance human assistance over a wide variety of application domains. Together with novel methods for dynamics and skill learning, flexible and easy-to-use robotic power tools and systems can be designed. Recently, our work has led to the first next generation robot Franka Emika that has recently become commercially available. The system is able to safely interact with humans, execute and even learn sensitive manipulation skills, is affordable and designed as a distributed interconnected system.

12:15-13:30 Lunch Buffet and Posters Presentations

13:30-15:30 Parallel sessions in Lecture Halls A, B, Pavillon, and Conference Room 1

Constrained learning (Lecture Hall A)

Session Chair: Petia Koprinkova-Hristova

13:30-13:50 Boosting Reinforcement Learning with Unsupervised Feature Extraction *Simon Hakenes, Tobias Glasmachers* (105)

13:50-14:10 A multi-objective Reinforcement Learning algorithm for JSSP *Beatriz M. Méndez-Hernández, Erick D. Rodríguez-Bazan, Yailen Martinez, Pieter Libin, Ann Nowé* (132)

14:10-14:30 Constraint-Based Visual Generation *Giuseppe Marra, Francesco Giannini, Michelangelo Diligenti, Marco Gori* (168)

14:30-14:50 A Reinforcement Learning Approach for Sequential Spatial Transformer Networks *Fatemeh Azimi, Federico Raue, Jörn Hees, Andreas Dengel* (178)

14:50-15:10 Mixed-Reality Deep Reinforcement Learning for a Reach-to-grasp Task Hadi Beik Mohammadi, Matthias Kerzel, Mohammad Ali Zamani, Stefan

Wermter (381)

15:10-15:30 RL extraction of syntax-based chunks for sentence compression *Hoa T. Le, Christophe Cerisara, Claire Gardent* (383)

BIGCHEM (Lecture Hall B)

Session Chair: Hongming Chen

13:30-13:50 Application of materials informatics tools to the analysis of combinatorial libraries of all metal-oxides photovoltaic cells *Omer Kaspi, Abraham Yosipof, Hanoch Senderowitz* (304)

13:50-14:10 Progressive Docking - a Deep Learning Based Approach for Accelerated Virtual Screening *Vibudh Agrawal, Michael Hsing, Francesco Gentile, Fuqiang Ban, Artem Cherkasov* (222)

14:10-14:30 Neural Network Guided Tree-Search Policies for Synthesis Planning *Amol Thakkar, Esben Jannik Bjerrum, Ola Engkvist, Jean-Louis Reymond* (177)

14:30-14:50 Improving Deep Generative Models with Randomized SMILES *Josep Arús-Pous, Esben Bjerrum, Christian Tyrchan, Jean-Louis Reymond, Hong-ming Chen, Ola Engkvist* (234)

14:50-15:10 Deep Neural Network Architecture for Drug-Target Interaction Prediction *Nelson Monteiro, Bernardete Ribeiro, Joel Arrais* (474)

15:10-15:30 Analysis and Modelling of False Positives in GPCR Assays *Dipan Ghosh, Igor Tetko, Bert Klebl, Peter Nussbaumer, Uwe Koch* (305)

Workshop on Reservoir Computing (Pavillon)

Session Chair: Alessio Micheli

13:30-14:20 Invited Talk: Reservoirs as Temporal Filters and Feature Mappings by *P. Tiňo*

Parametrized state space models in the form of recurrent networks are often used in machine learning to learn from data streams exhibiting temporal dependencies. To break the black box nature of such models it is important to understand the dynamical features of the input driving time series that are formed in the state space.

I will talk about a framework for rigorous analysis of such state representations in vanishing memory state space models, such as echo state networks (ESN).

In particular, we will view the state space as a temporal feature space and the readout mapping from the state space as a kernel machine operating in that feature space. This viewpoint leads several rather surprising results linking the structure of the reservoir coupling matrix with properties of the dynamic feature space.

14:30-14:50 Reservoir Topology in Deep Echo State Networks *Claudio Gallicchio, Alessio Micheli* (505)

14:50-15:10 Hyper-spherical reservoirs for Echo State Networks *Pietro Verzelli, Cesare Alippi, Lorenzo Livi* (322)

15:10-15:30 Bistable Perception in Conceptor Networks *Felix Meyer zu Driehausen, Rüdiger Busche, Johannes Leugering, Gordon Pipa* (172)

Deep Learning in Image Reconstruction (Conference Room 1)

Session Chair: Werner Dubitzky

13:30-13:50 Instance-based Segmentation for Boundary Detection of Neuropathic Ulcers through Mask-RCNN *Chathurika Gamage, Isuru Wijesinghe, Indika Perera* (263)

13:50-14:10 Capsule Networks for attention under occlusion *Antonio Rodriguez-Sanchez, Tobias Dick* (421)

14:10-14:30 IP-GAN: Learning Identity and Pose Disentanglement in Generative Adversarial Networks *Bassel Zeno, Ilya Kalinovskiy, Iurii Matveev* (454)

14:30-14:50 Hypernetwork functional image representation *Sylwester Klocek, Lukasz Maziarka, Maciej Wołczyk, Jacek Tabor, Jakub Nowak, Marek Śmieja* (73)

14:50-15:10 A Sparse Filtering-based Approach for Non-Blind Deep Image Denoising *Rafael Pires, Daniel Santos, Alexandre Levada, Joao Papa* (7)

15:30-16:00 Coffee Break and Posters Presentations

The list with Posters' titles for this day is available on the page 37.

16:00-18:00 Parallel sessions in Lecture Halls A, B, Pavillon, and Conference Room 1

Neural Network Memory and Domain Adaptation (Lecture Hall A)

Session Chair: Igor Farkaŝ

16:00-16:20 Evaluation of domain adaptation approaches for robust classification of heterogeneous biological data sets *Michael Schneider, Lichao Wang, Carsten Marr* (185)

16:20-16:40 Inferring Event-Predictive Goal-Directed Object Manipulations in REPRISE *Martin Butz, Tobias Menge, Dania Humaidan, Sebastian Otte* (255)

16:40-17:00 Bidirectional associative memory with block coding: A comparison of iterative retrieval methods *Andreas Knoblauch, Guenther Palm* (294)

17:00-17:20 Increasing the Generalisaton Capacity of Conditional VAEs *Alexej Klushyn, Nutan Chen, Botond Cseke, Justin Bayer, Patrick van der Smagt* (419)

17:20-17:40 A study on catastrophic forgetting in deep LSTM networks *Monika Schak, Alexander Gepperth* (434)

17:40-18:00 Incorporating Adaptive RNN-based Action Inference and Sensory Perception *Sebastian Otte, Jakob Stoll, Martin Butz* (497)

Text processing (Lecture Hall B)

Session Chair: Jaakko Peltonnen

16:00-16:20 Jointly Learning to Detect Emotions and Predict Facebook Reactions *Lisa Graziani, Stefano Melacci, Marco Gori* (337)

16:20-16:40 Multi-modal associative storage and retrieval using Hopfield autoassociative memory network *Rachna Shriwas, Prasun Joshi, Vandana M. Ladwani, V Ramasubramanian* (393)

16:40-17:00 LSTM Prediction on Sudden Occurrence of Maintenance Operation of Air-conditioners in Real-time Pricing Adaptive Control *Shun Matsukawa, Chuzo Ninagawa, Junji Morikawa, Takashi Inaba, Seiji Kondo* (29)

17:00-17:20 A Judicial Sentencing Method Based on Fused Deep Neural Networks *Yuhan Yin, Hongtian Yang, Zhihong Zhao, Songyu Chen* (129)

17:20-17:40 An ensemble model for winning a Chinese machine reading comprehension competition *Jun He, Yongjing Cheng, Min Wang, Jingyu Xie, Wei Xie, Rui Su, Shandong Yuan, Yao Cui* (45)

Workshop on Reservoir Computing (Pavillon)

Session Chair: Miguel C. Soriano

16:00-16:20 Optoelectronic reservoir computing using a mixed digital-analog hardware implementation *Miguel C. Soriano, Pau Massuti-Ballester, Jesús Yelo Sarrión, Ingo Fischer* (384)

16:20-16:40 A power-efficient architecture for on-chip reservoir computing *Stijn Sackesyn, Chonghuai Ma, Andrew Katumba, Joni Dambre, Peter Bienstman* (306)

16:40-17:00 Reservoir-size dependent learning in analogue neural networks *Xavier Porte, Louis Andreoli, Maxime Jacquot, Laurent Larger, Daniel Brunner* (479)

17:00-17:20 Comparison of Feature Extraction Techniques for Handwritten Digit Recognition with a Photonic Reservoir Computer *Piotr Antonik, Nicolas Marsal, Daniel Brunner, Damien Rontani* (392)

17:40-18:00 Concluding Remarks

BIGCHEM (Conference Room 1)

Session Chair: Artem Cherkasov

16:00-16:20 Attention and Edge Memory Convolution for Bioactivity Prediction *Michael Withnall, Edvard Lindelöf, Ola Engkvist, Hongming Chen* (235)

16:20-16:40 Detection of Frequent-Hitters across various HTS Technologies *Laurianne David, Jarrod Walsh, Juergen Bajorath, Ola Engkvist* (336)

16:40-17:00 Prediction of the Atomization Energy of Molecules Using Coulomb Matrix and Atomic Composition in a Bayesian Regularized Neural Networks *Alain Tchagang, Julio Valdes* (445)

17:00-17:20 A Transformer Model for Retrosynthesis *Pavel Karpov, Guillaume Godin, Igor Tetko* (520)

17:20-17:40 Augmentation is What You Need! *Igor Tetko, Pavel Karpov, Eric Bruno, Talia Kimber, Guillaume Godin* (523)

17:40-18:00 Mol-CycleGAN – a generative model for molecular optimization *Lukasz Maziarka, Agnieszka Pocha, Jan Kaczmarczyk, Krzysztof Rataj, Michał Warchoł* (475)

18:00-18:15 Coffee Break

18:15-19:30 Best Papers/Travel Grants Award Ceremony, and Conference Closing

Posters (Day 1): I and II Volumes of the Proceedings

All posters are sorted by the article ID that each work received during the submission process. Each poster session also has a portion of online posters from different volumes of the Proceedings.

- 1. Leveraging Domain Knowledge for Reinforcement Learning using MMC Architectures *Rajkumar Ramamurthy, Christian Bauckhage, Rafet Sifa, Jannis Schücker, Stefan Wrobel* (37)
- 2. Counting with Analog Neurons Jiri Sima (39)
- 3. Estimating and factoring the dropout induced distribution with Gaussian mixture model *Jingo Adachi* (47)
- 4. Tree Memory Networks for Sequence Processing *Frederik Diehl, Alois Knoll* (51)
- 5. On Practical Approach to Uniform Quantization of Non-redundant Neural Networks *Alexander Goncharenko, Andrey Denisov, Sergey Alyamkin, Evgeny Terentev* (65)
- 6. A Comparative Analysis of Preprocessing Methods for Single Trial Event Related Potential Detection *Wajid Mumtaz, Lukas Vareka, Roman Mouček* (74)
- 7. Singular Value Decomposition and Neural Networks Bernhard Bermeitinger, Tomas Hrycej, Siegfried Handschuh (77)
- 8. A Multi-Armed Bandit Algorithm Available in Stationary or Non-Stationary Environments Using Self-Organizing Maps *Nobuhito Manome, Shuji Shinohara, Kouta Suzuki, Kosuke Tomonaga, Shunji Mitsuyoshi* (78)
- 9. Residual learning for FC kernels of convolutional network *Alexey Alexeev, Iurii Matveev, Anton Matveev* (81)
- 10. Cooperation and Coordination Regimes by Deep Q-Learning in Multi-agent Task Executions *Yuki Miyashita, Toshiharu Sugawara* (84)
- 11. Learning Internal Dense But External Sparse Structures of Deep Convolutional Neural Network *Yiqun Duan, Chen Feng* (86)
- 12. Fast Approximate Geodesics for Deep Generative Models Nutan Chen, Francesco Ferroni, Alexej Klushyn, Alexandros Paraschos, Justin Bayer, Patrick van der Smagt (103)
- 13. Discrete Stochastic Search and its Application to Feature-Selection for Deep Relational Machines *Tirtharaj Dash, Ashwin Srinivasan, Ramprasad S Joshi, A Baskar* (120)
- 14. An Evaluation of Various Regression Models for the Prediction of Two-Terminal Network Reliability Sabina-Adriana Floria, Florin Leon, Petru Cascaval, Doina Logofatu (131)
- 15. Sleep State Analysis using Calcium Imaging Data by Non-negative Matrix

Factorization Mizuo Nagayama, Toshimitsu Aritake, Hideitsu Hino, Takeshi Kanda, Takehiro Miyazaki, Masashi Yanagisawa, Shotaro Akaho, Noboru Murata (135)

- 16. Sequence disambiguation with synaptic traces in associative neural networks *Ramón Martinez, Oskar Kviman, Anders Lansner, Pawel Herman* (142)
- 17. On Deep Set Learning and the Choice of Aggregations *Maximilian Soelch, Adnan Akhundov, Patrick van der Smagt, Justin Bayer* (145)
- 18. Hilbert Vector Convolutional Neural Network: 2D Neural Network on 1D Data Nasrulloh Loka, Takio Kurita, Kavitha MS (152)
- 19. A Label-specific Attention-based Network with Regularized Loss for Multilabel Classification *Xiangyang Luo, Xiangying Ran, Wei Sun, Yunlai Xu, Chongjun Wang* (163)
- 20. Simultaneously Learning Architectures and Features of Deep Neural Networks *Tinghuai Wang, Lixin Fan, Huiling Wang* (164)
- 21. Multi-objective Pruning for CNNs using Genetic Algorithm Yang Chuanguang, An Zhulin, Li Chao, Diao Boyu, Xu Yongjun (208)
- 22. Widely Linear Complex-valued Autoencoder: Dealing with Noncircularity in Gene-rative-Discriminative Models *Zeyang Yu, Shengxi Li, Danilo Mandic* (210)
- 23. A Novel Modification on the Levenberg-Marquardt Algorithm for Avoiding Overfitting in Neural Network Training *Serdar İplikçi, Batuhan Bilgi, Ali Menemen, Bedri Bahtiyar* (226)
- 24. Conditions for Unnecessary Logical Constraints in Kernel Machines Francesco Giannini, Marco Maggini (254)
- 25. Squeezed Very Deep Convolutional Neural Networks for Text Classification Andrea Duque, Luã Santos, David Macêdo, Cleber Zanchettin (261)
- 26. Evaluating CNNs on the Gestalt Principle of Closure Gregor Ehrensperger, Sebastian Stabinger, Antonio Rodriguez-Sanchez (264)
- 27. Sign Based Derivative Filtering for Stochastic Gradient Descent Konstantin Beres-tizshevsky, Guy Even (280)
- 28. A multitask learning neural network for short-term traffic speed prediction and confidence estimation *Yanyun Tao, Xiang Wang, Yuzhen Zhang* (301)
- 29. Stability analysis of a generalised class of BAM neural networks with mixed delays *Chaouki Aouiti, Farouk Chérif, Anis Zeglaoui* (307)
- 30. Dissipativity Analysis of a Class of Competitive Neural Networks with Proportional Delays *Chaouki Aouiti, Farouk Chérif, Farid Touati* (308)
- 31. Transfer Learning with Sparse Associative Memories *Quentin Jodelet, Vincent Gripon, Masafumi Hagiwara* (309)
- 32. Detection of directional information flow induced by TMS based on symbolic transfer entropy *Ye Song, Keiichi Kitajo, Katsunori Kitano* (315)
- 33. Brain-Inspired Hardware for Artificial Intelligence: Accelerated Learning in

a Physi-cal-Model Spiking Neural Network *Timo Wunderlich, Akos Kungl, Eric Müller, Johannes Schemmel, Mihai A. Petrovici* (320)

- 34. CancelOut: A layer for feature selection in deep neural networks *Vadim Borisov, Johannes Haug, Gjergji Kasneci* (325)
- 35. On Unsupervised Learning of Traversal Cost and Terrain Types Identification using Self-Organizing Maps *Jan Faigl, Milos Pragr* (344)
- 36. Light-Weight Edge Enhanced Network for On-orbit Semantic Segmentation Junxing Hu, Ling Li, Yijun Lin, Fengge Wu, Junsuo Zhao (347)
- 37. A Neural Network for Semi-Supervised Learning on Manifolds Alexander Genkin, Anirvan Sengupta, Dmitri Chklovskii (352)
- Filter Method Ensemble with Neural Networks Anuran Chakraborty, Rajonya De, Agneet Chatterjee, Ram Sarkar, Friedhelm Schwenker, Rajonya De (357)
- 39. Marginal Replay vs Conditional Replay for Continual Learning *Timothée Lesort, Alexander Gepperth, Andrei Stoian, David Filliat* (359)
- 40. PCI: Principal Component Initialization for Deep Autoencoders Aiga Suzuki, Hidenori Sakanashi (364)
- 41. Improving Weight Initialization of ReLU and Output Layers *Diego Aguirre, Olac Fuentes* (370)
- 42. Dynamic Centroid Insertion and Adjustment for Data Sets with Multiple Imbalanced Classes *Evandro Silva, Cleber Zanchettin* (375)
- 43. HiSeqGAN: Hierarchical Sequence Synthesis and Prediction *Yun-Chieh Tien, Chen-Min Hsu, Fang Yu* (379)
- 44. Training Delays in Spiking Neural Networks Laura State, Pau Vilimelis Aceituno (391)
- 45. An Izhikevich Model Neuron MOS Circuit for Low Voltage Operation Yuki Tamura, Satoshi Moriya, Tatsuki Kato, Masao Sakuraba, Yoshihiko Horio, Shigeo Sato (407)
- 46. Benchmarking Incremental Regressors in Traversal Cost Assessment *Milos Pragr, Jan Faigl* (417)
- 47. On the Interpretation of Recurrent Neural Networks as Finite State Machines *Christian Oliva, Luis F. Lago-Fernández* (423)
- 48. FMNet: Multi-Agent Cooperation by Communicating with Featured Message Network *Jiheng Jiang, Shuangjiu Xiao, Linling Xun* (424)
- 49. Simplified computation and interpretation of Fisher matrices in incremental learning with deep neural networks *Alexander Gepperth, Florian Wiech* (428)
- 50. Compute-efficient neural network architecture optimization by a genetic algorithm *Sebastian Litzinger, Andreas Klos, Wolfram Schiffmann* (433)
- 51. Local Normalization Based BN Layer *Pruning Yuan Liu, Xi Jia, Linlin Shen, Zhong Ming, JinMing Duan* (442)
- 52. Application of Self Organizing Map to Preprocessing Input Vectors for Con-

volutional Neural Network Hiroshi Dozono, Masafumi Tanaka (446)

- 53. Chaotic Complex-Valued Associative Memory with Adaptive Scaling Factor Independent of Multi-Values *Hiroaki Goto, Yuko Osana* (456)
- 54. Swap kernel regression Masaharu Yamamoto, Koichiro Yamauchi (476)
- 55. CPG driven RBF Network Control with Reinforcement Learning for Gait Optimization of a Dung Beetle-like Robot *Matheshwaran Pitchai, Xiaofeng Xiong, Mathias Thor, Peter Lukas Mailänder, Binggwong Leung, Tomas Kulvicius, Poramate Manoonpong* (488)
- 56. Basic Evaluation Scenarios for Incrementally Trained Classifiers *Rudolf Szadkowski, Jan Drchal, Jan Faigl* (491)
- 57. Linear Memory Networks *Davide Bacciu, Antonio Carta, Alessandro Sperduti* (526)

Online posters

- 1. Deep Recurrent Neural Networks with Nonlinear Masking Layers and Two-Level estimation for Speech Separation *Jiantao Zhang*, *Pingjian Zhang* (2)
- 2. Adaptive Graph Fusion for Unsupervised Feature Selection *Sijia Niu, Pengfei Zhu, Qinghua Hu, Hong Shi* (42)
- 3. Signed Graph Attention Networks *Junjie Huang, Huawei Shen, Liang Hou, Xueqi Cheng* (059)
- 4. Self-attention StarGAN for Multi-domain Image-to-image Translation Ziliang He, Zhenguo Yang, Xudong Mao, Jianming Lv, Qing Li, Wenyin Liu (62)
- 5. A New Learning-based One Shot Detection Framework For Natural Images Sen Na, Ruoyu Yang (64)
- 6. Joint Metric Learning on Riemannian Manifold of Global Gaussian Distributions *Qinqin Nie, Pengfei Zhu, Qinghua Hu, Hao Cheng, Bin Zhou* (66)
- 7. Multi-Task Sparse Regression Metric Learning for Heterogeneous Classification *Haotian Wu*, *Pengfei Zhu*, *Qinghua Hu*, *Hong Shi*, *Bin Zhou* (89)
- 8. Transferable Adversarial Cycle Alignment for Domain Adaption *Yingcan Wei* (97)
- 9. Research on Image-to-Image Translation with Capsule Network *Jian Ye, Qing Chang, Xiaotian Jia* (101)
- 10. Central diffused Instance Generation Method in Class Incremental Learning *Mingyu Liu, Yijie Wang* (102)
- 11. Dependent Multilevel Interaction Network for Natural Language Inference Yun Li, Yan Yang, Yong Deng, Qinmin Vivian Hu, Chengcai Chen, Liang He, Zhou Yu (111)
- 12. Unsupervised Feature Selection via Local Total-order Preservation Rui

Ma, Yijie Wang, Li Cheng (117)

13. EchoQuan-Net: Direct Quantification of Echo Sequence for Left Ventricle Multidimensional Indices via Global-Local Learning, Geometric Adjustment, and multi-target relation learning *Rongjun Ge, Guanyu Yang, Chenchu Xu, Jiulou Zhang, Yang Chen, Limin Luo, Cheng Feng, Heye Zhang, Shuo Li* (119)

Posters (Day 2): III and IV Volumes of the Proceedings

All posters are sorted by the article ID that each work received during the submission process.

- 1. Delving into the Impact of Saliency Detector: A GeminiNet for Accurate Saliency Detection *Tao Zheng, Bo Li, Delu Zeng, Zhiheng Zhou* (15)
- 2. Unsharp Masking Layer: Injecting Prior Knowledge in Convolutional Networks for Image Classification *Jose Carranza-Rojas, Saul Calderon Ramirez, Adán Mora-Fallas, Michael Granados-Menani, Jordina Torrents Barrena* (24)
- 3. Soft Subspace Growing Neural Gas for DataStream Clustering Mohammed Oualid Attaoui, Mustapha Lebbah, Nabil Keskes, Hanene Azzag, Mohammed Ghesmoune (36)
- 4. Region Prediction from Hungarian Folk Music Using Convolutional Neural Networks *Anna Kiss, Zalan Bodo, Csaba Sulyok* (44)
- 5. A lightweight neural network for hard exudate segmentation of fundus image *Song Guo, Tao Li, Kai Wang, Chan Zhang, Hong Kang* (48)
- 6. Neural Network 3D Body Pose Tracking and Prediction for Motion-to-Photon Latency Compensation in Distributed Virtual Reality *Sebastian Pohl, Armin Becher, Thomas Grauschopf, Cristian Axenie* (54)
- 7. Mid Roll Advertisement Placement using Multi Modal Emotion Analysis Sumanu Rawat, Aman Chopra, Siddhartha Singh, Shobhit Sinha (55)
- 8. An improved convolutional neural network for steganalysis in the scenario of reuse of the stego-key *Bartosz Czaplewski* (57)
- 9. Generative Creativity: Adversarial Learning for Bionic Design *Simiao Yu, hao dong, Pan Wang, Chao Wu, Yike Guo* (58)
- 10. FCN Salient Object Detection Using Region Cropping *Yikai Hua, Xiaodong Gu* (67)
- 11. Dynamic Ensemble Using Previous and Predicted Future Performance for Multi-Step-Ahead Solar Power Forecasting *Irena Koprinska, Md Mashud Rana, Ashfaqur Rahman* (68)

- 12. Collaborative Attention Network with Word and N-gram Sequences Modeling for Sentiment Classification *Junwei Bao, Liang Zhang, Bo Han* (109)
- 13. Symmetrical Adversarial Training Nets: A Novel Model For Text Generation Yong-Zhen Gao, Chongjun Wang (110)
- 14. A Novel Image Captioning Method based on Generative Adversarial Networks *Yang Fan, Jungang Xu, Yingfei Sun, Yiyu Wang* (113)
- 15. Merging DBSCAN and Density Peak for Robust Clustering Jian Hou, Chengcong Lv, Aihua Zhang, Xu E (124)
- 16. Generative Adversarial Networks for Operational Scenario Planing of Renewable Energy Farms: A Study on Wind and Photovoltaic *Jens Schreiber, Maik Jessulat, Bernhard Sick* (138)
- 17. Quality-Diversity Summarization with Unsupervised Autoencoders *Lei Li, Zuying Huang, Natalia Vanetik, Marina Litvak* (141)
- 18. Variational Deep Embedding with Regularized Student-t Mixture Model *Taisuke Kobayashi* (162)
- 19. An Application of Convolutional Neural Networks for Analyzing Dogs Sleep Patterns Anna Zamansky, Aleksandr Sinitca, Dmitrii Kaplun, Michael Plazner, Ivana G. Schork, Robert J. Young, Cristiano S. de Azevedo (173)
- 20. Text to Image Synthesis based on Multiple Discrimination *Zhiqiang Zhang*, Yunye Zhang, Wenxin Yu, Jingwei Lu, Li Nie, Gang He, Ning Jiang, Gang He, Yibo Fan, Zhuo Yang (201)
- 21. Conditional GANs for Image Captioning with Sentiments *Tushar Karayil, Asif Irfan, Federico Raue, Jörn Hees, Andreas Dengel* (231)
- 22. Market basket analysis using Boltzmann machines *Mauricio Valle, Gonzalo Ruz* (236)
- 23. Dimensionality Reduction for Clustering and Cluster Tracking of Cytometry Data *Givanna Putri, Mark N. Read, Irena Koprinska, Thomas M. Ashhurst, Nicholas King* (240)
- 24. Robust Gait Authentication Using Autoencoder and Decision Tree *Mitsuhiro Ogihara, Hideyuki Mizuno* (245)
- 25. Disentangling Latent Factors of Variational Auto-Encoder with Whitening Sangchul Hahn, Heeyoul Choi (266)
- 26. On the Inability of Markov Models to Capture Criticality in Human Mobility Vaibhav Kulkarni, Abhijit Mahalunkar, Benoit Garbinato, John Kelleher (269)
- 27. Referring Expression Comprehension via Co-attention and Visual Context *Youming Gao, Yi Ji, Ting Xu, Yunlong Xu, Chunping Liu* (271)
- 28. Comparison between U-Net and U-ReNet models in OCR tasks *Brian Moser, Federico Raue, Jörn Hees, Andreas Dengel* (279)
- 29. Prediction of the Next Sensor Event and its Time of Occurrence in Smart Homes *Flávia Dias Casagrande, Jim Tørresen, Evi Zouganeli* (282)
- 30. Robust Sound Event Classification with Local Time-Frequency Information

and Convolutional Neural Networks Yanli Yao, Qiang Yu, Longbiao Wang, Jianwu Dang (285)

- 31. MAD-GAN: Multivariate Anomaly Detection for Time Series Data with Generative Adversarial Networks *Dan Li, Dacheng Chen, Baihong Jin, Lei Shi, Jonathan Goh, See-Kiong Ng* (291)
- 32. Multi-task Learning Method for Hierarchical Time Series Forecasting *Maoxin Yang, Qinghua Hu, Yun Wang* (323)
- 33. DCAR: Deep Collaborative Autoencoder for Recommendation with Implicit Feedback *Jiong Wang, Neng Gao, Jia Peng, Jingjie Mo* (333)
- 34. Demand-prediction architecture for distribution businesses based on multiple RNNs with alternative weight update *Yuya Okadome, Wenpeng Wei, Ryo Sakai, Toshiko Aizono* (338)
- 35. Training Discriminative Models to Evaluate Generative Ones *Timothée Lesort, Andrei Stoian, Jean-François Goudou, David Filliat* (358)
- 36. Towards Attention based Vulnerability Discovery using Source Code Representation *Junae Kim, David Hubczenko, Paul Montague* (361)
- 37. Improving Deep Image Clustering With Spatial Transformer Layers *Thiago Vinicius Machado de Souza, Cleber Zanchettin* (362)
- Composite Quantile Regression Long Short-Term Memory Network Zongxia Xie, Hao Wen (369)
- 39. Short-Term Temperature Forecasting on a Several Hours Horizon *Louis Desportes, Pierre Andry, Inbar Fijalkow, Jérôme David* (387)
- 40. Comparative Research on SOM with Torus and Sphere Topologies for Peculiarity Classification of Flat Finishing Skill Training *Masaru Teranishi*, *Shimpei Matsumoto, Hidetoshi Takeno* (389)
- 41. Discriminative Feature Learning using Two-stage Training Strategy for Facial Expression Recognition *Lei Gan, Yuexian Zou, Can Zhang* (399)
- 42. Interdependence Model for Multi-label Classification *Kosuke Yoshimura, Tomoaki Iwase, Yukino Baba, Hisashi Kashima* (401)
- 43. Using Long Short-Term Memory for Wavefront Prediction in Adaptive Optics *Xuewen Liu, Tim Morris, Chris Saunter* (402)
- 44. An Adaptive Feature Channel Weighting Scheme for Correlation Tracking *Zhen Zhang, Chao Wang, Xiqun Lu* (403)
- 45. Discriminative Feature Learning for Speech Emotion Recognition Yuying Zhang, Yuexian Zou, Junyi Peng, Danqing Luo, Dongyan Huang (411)
- 46. Collaborative Non-negative Matrix Factorization Kaoutar Benlamine, Nistor Grozavu, Younès Bennani, Basarab Matei (415)
- 47. Robustness of deep LSTM networks in freehand gesture recognition *Alexander Gepperth, Monika Schak* (431)
- 48. Surrounding Based Attention Networks for Aspect-Level Sentiment Classification Yueheng Sun, Xianchen Wang, Hongtao Liu, Wenjun Wang, Pengfei Jiao (435)

- 49. In-silico staining from bright-field and fluorescent images using deep learning *Dominik Jens Elias Waibel, Ulf Tiemann, Valerio Lupperger, Henrik Semb, Carsten Marr* (437)
- 50. Combining deep learning and (structural) feature-based classification methods for copyright-protected PDF documents *Renato Garita Figueiredo, Tobias Thelen, Kai-Uwe Kühnberger, Gordon Pipa* (443)
- 51. Learning Relational-Structural Networks for Robust Face Alignment *Con*gcong Zhu, Xing Wang, Suping Wu, Zhenhua Yu (447)
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