Curriculum Vitae

Personal Data

Full Name	Petra Vidnerová, née Kudová
Born	7 May 1977 in Plzeň, Czech Republic
Citizenship	Czech Republic
Contact	petra@cs.cas.cz, http://www.cs.cas.cz/petra

ORCID: 0000-0003-3879-3459 ResearchID: G-2718-2014 Scopus: 25121797400

Research Interests

Machine learning, supervised learning. Deep learning.
Hyper-parameter setup, meta-learning. AutoML. Neural architecture search.
Genetic algorithms, evolutionary and hybrid approaches.
Epidemic modelling. Agent based models.

Work Experience

since 2012	**scientist**, Institute of Computer science, The Czech Academy of Sciences
	Department of Artificial Intelligence (in the past Department of Machine Learning, Department of Theoretical Computer Science).
2007 - 2012	**postdoc**, Institute of Computer science, The Czech Academy of Sciences
	Mainly working part time (parental leave).
2001 - 2007	**PhD student**, Institute of Computer science, The Czech Academy of Sciences
	One of the key developers of the multi-agent system Bang (system designed for hybrid models of artificial intelligence, written in C/C++).

Education

2001 - 2007	PhD at Faculty of Mathematics and Physics, Charles University, Prague.
	Topic of PhD thesis: *Learning with Regularization Networks.* Supervised by Mgr. Roman Neruda, CSc.
2003	RNDr. in Computer Science, Faculty of Mathematics and Physics, Charles University, Prague.
1995 - 2001	Mgr. in Computer Science, Faculty of Mathematics and Physics, Charles University, Prague.
	Master thesis: *Learning algorithms for RBF networks.* Supervised by Mgr. Roman Neruda, CSc. Software project: MAGDON (Data mining using genetic algorithms).

Visits Abroad

February 2006	Machine Learning Summer School. Canberra, Australia. (Volunteering.)
April - June 2005, November 2005	Two visits at Edinburgh Parallel Computing Center (EPCC), Edinburgh University, United Kingdom.
	As a grantee of HPC-Europa project. Hosted by Prof. Ben Paechter, School of Computing, Napier University, Edinburgh.
July 2002	Neural Networks Summer School. Porto, Portugal.

Awards

Best Paper Award	conference ITAT, Slovakia, 2017, P. Vidnerová, R. Neruda. Evolution Strategies for Deep Neural Network Models Design.
Best Result of ICS	for the year 2022, in the cathegory *Publication with Application or Social Impact*
	awarded paper: L. Berec, R. Levínský, J. Weiner, M. Šmíd, R. Neruda, P. Vidnerová, G. Suchopárová: Importance of vaccine action and availability and epidemic severity for delaying the second vaccine dose. Scientific Reports, 2022

Teaching and Comittee Memberships

Courses	Evolutionary algorithms (practical course), The Faculty of Mathematics and Physics, Charles University, 2006-2008
Students	Rudolf Kadlec, The Faculty of Mathematics and Physics, Charles University
	supervising Rudolf's diploma thesis: Evolution of intelligent agent behaviour in computer games, 2008
Commitee Memberships	committee for PhD thesis defence, the opponent of Ing. Martin Šlapák's thesis, Faculty of Information Technology, Czech Technical University (2018, 2019)
	committee for PhD thesis defence, the opponent of RNDr. Viliam Dillinger's thesis, Comenius University in Bratislava (2019)
	committee for PhD thesis defence, the opponent of Ing. Dalibor Cimr's thesis, University of Hradec Králové, Faculty of Informatics and Management (2023)

Current Projects

AppNeCo: Approximate Neurocomputing, Czech Grant Agency, no. 22-02067S, 2022-2024 (team member)

Recent Projects

National Competence Center - Cybernetics and Artificial Intelligence, Technology Agency of the Czech Republic, no. TN01000024, 2019 - 2022 (team member)

Město pro lidi, ne pro virus - Technology Agency of the Czech Republic, no. TL04000282, 2020/21 (team member)

Capabilities and Limitations of Shallow and Deep Networks, Czech Grant Agency, no. 18-23827S, 2018-2020 (team member)

Model complexity of neural, radial, and kernel networks, Czech Grant Agency, no. 15-18108S, 2015-2017 (team member)

Selected Publications

L. Berec, T. Diviák, A. Kuběna, R. Levínský, R. Neruda, G. Suchopárová, J. Šlerka, M. Šmíd, J. Trnka, V. Tuček, Petra Vidnerová, M. Zajíček, *On the contact tracing for COVID-19: A simulation study*, Epidemics, Volume 43, (2023), ISSN 1755-4365.

J. Kalina, A. Neoral, P. Vidnerová. *Effective Automatic Method Selection for Nonlinear Regression Modeling.* International Journal of Neural Systems. Roč. 31, č. 10 (2021), paper no. 2150020. ISSN 0129-0657.

P. Vidnerová, R. Neruda. *Vulnerability of classifiers to evolutionary generated adversarial examples.* Neural Networks. Volume 127, July 2020, p. 168-181. ISSN 0893-6080.

S. Slušný, R. Neruda, P. Vidnerová. *Comparison of Behavior-based and Planning Techniques on the Small Robot Maze Exploration Problem.* Neural Networks. Volume 23, Issue 4 (2010), p. 560-567. ISSN 0893-6080.

R. Neruda, P. Kudová. *Learning Methods for Radial Basis Functions Networks.* Future Generation Computer Systems. 21. (2005), p. 1131-1142. ISSN 0167-739X

Software

rbf_keras	Implementation of an RBF layer for the Keras library. Available at https://github.com/PetraVidnerova/rbf_keras (12 citations accoding to GoogleScholar, 136 Github stars)	
Model M	Multiagent epidemic model. One of the key developers. Available at https://github.com/epicity-cz/model-m	

Selected Talks

From perceptron to deep neural networks, 2019, Workshop Teorie a praxe statistického zpracování dat, Palacký University Olomouc, Nová Seninka.

Adversarial examples - vulnerability of machine learning methods and prevention, 2018, Seminar of the Institute of Information Theory and Automation of the Czech Academy of Sciences, Prague.

Evolving Architectures of Deep Neural Networks, 2018, Machine Learning and Modelling Seminar, The Faculty of Mathematics and Physics, Charles University, Prague.

Evolution of Composite Kernel Functions for Regularization Networks, 2011, Machine Learning and Modelling Seminar, The Faculty of Mathematics and Physics, Charles University, Prague.

Hybrid learning methods in Bang and Regularization Networks, 2005, department seminar at University of Edinburgh, UK.

Popularization

Talk *Model M - an agent based epidemiological model*, at the BISOP book launch event, 2023.

Talk in Czech *Umělá inteligence: dobrý sluha, zlý pán?*, Open Day, Institute of Computer Science, The Czech Academy of Sciences, 2019.

Talk in Czech *Hluboké neuronové sítě*, Open Day, Institute of Computer Science, The Czech Academy of Sciences, 2017.

Joint talk with Roman Neruda at the seminar for high school teachers, Nové Hrady, 2008.

Community Service

professional	PC member, reviewer
	member of conference programme committees: AIAI 2016, AIAI 2018-2023, EANN 2015-2023, EML GECCO 2016-2023, IJCNN 2017, IJCNN 2019-2023, ICANN 2018, ICANN 2023, ICONIP 2023, ITAT 2009
	reviewing for scientific journals: Neural Processing Letters, IEEE Transactions on Cybernetics, Computing and Informatics, IEEE Transactions on Evolutionary Computations, Neural Networks, Natural Computing, Analytical Letters, IEEE Transactions on Neural Networks and Learning Systems, Computer Science Review, IEEE Sensors Journal, Computers & security; reviewer for GA UK
	working as a Scientific Secretary of Institute of Computer Science (since 2023)
	taking care of the blog of Institute of Computer Science (since 2015)
	BISOP, scientific board member (since 2020)
	http://bisop.cz
free-time	teaching at PyLadies.cz courses (since 2018)
	PyLadies is a community of female Python programmers helping women to get familiar with IT.
	author of machine learning study materials for data analysis course organised by PyLadies & PyData community (2020).

Languages

Czech	native
English	C1 (CAE certificate, 2006)
German	elementary

Other skills

Programming Languages	Python, bash (in past: Pascal, C/C++, MPI, Perl, PHP, SQL, JavaScript), basic knowledge of HTML and CSS
	familiar with Python libraries: numpy, pandas, matplotlib, seaborn, scikit-learn, Keras, Tensorflow, Pytorch
	AI Intel certificate
Other	LaTeX, git, enthusiastic Linux user

Full List of Publications

Journal papers

Berec, Luděk - Diviák, Tomáš - Kuběna, Aleš - Levínský, René - Neruda, Roman - Suchopárová, Gabriela - Šlerka, Josef - Šmíd, Martin - Trnka, Jan - Tuček, Vít - Vidnerová, Petra - Zajíček, Milan, *On the contact tracing for COVID-19: A simulation study*, Epidemics, Volume 43, (2023), ISSN 1755-4365.

Berec, Luděk - Smyčka, J. - Levínský, René - Hromádková, Eva - Šoltés, Michal - Šlerka, J. - Tuček, V. - Trnka, J. - Šmíd, Martin - Zajíček, Milan - Diviák, T. - Neruda, Roman - Vidnerová, Petra, *Delays, Masks, the Elderly, and Schools: First Covid-19 Wave in the Czech Republic*, Bulletin of Mathematical Biology, 84, no. 8 (2022), ISSN 0092-8240

Berec, Luděk - Levínský, R. - Weiner, J. - Šmíd, Martin - Neruda, Roman - Vidnerová, Petra - Suchopárová, Gabriela, *Importance of vaccine action and availability and epidemic severity for delaying the second vaccine dose*, Scientific Reports, 12, no. 1 (2022), ISSN 2045-2322

Kalina, Jan - Vidnerová, Petra, *Least Weighted Squares Quantiles Reveal How Competitiveness Contributes to Tourism Performance*, Finance a úvěr-Czech Journal of Economics and Finance, 72, no. 2 (2022), pages 150-171, ISSN 0015-1920

Kalina, Jan - Neoral, Aleš - Vidnerová, Petra, *Effective Automatic Method Selection for Nonlinear Regression Modeling*, International Journal of Neural Systems, 31, no. 10 (2021), ISSN 0129-0657

Vidnerová, Petra - Neruda, Roman, *Air Pollution Modelling by Machine Learning Methods*, Modelling, 2, no. 4 (2021), pages 659-674

Vidnerová, Petra - Neruda, Roman, *Vulnerability of classifiers to evolutionary generated adversarial examples*, Neural Networks, 127, July (2020), pages 168-181, ISSN 0893-6080

Vidnerová, Petra - Neruda, Roman, *Kernel Function Tuning for Single-Layer Neural Networks*, International Journal of Machine Learning and Computing, 8, no. 4 (2018), pages 354-360, ISSN 2010-3700

Slušný, Stanislav - Neruda, Roman - Vidnerová, Petra, *Comparison of Behavior-based and Planning Techniques on the Small Robot Maze Exploration Problem*, Neural Networks, 23, no. 4 (2010), pages 560-567, ISSN 0893-6080

Neruda, Roman - Vidnerová, Petra, *Learning Errors by Radial Basis Function Neural Networks and Regularization Networks*, International Journal of Grid and Distributed Computing, 1, no. 2 (2009), pages 49-57, ISSN 2005-4262

Neruda, Roman - Kudová, Petra, *Learning Methods for Radial Basis Functions Networks*, Future Generation Computer Systems, 21, - (2005), pages 1131-1142, ISSN 0167-739X

Neruda, Roman - Kudová, Petra, *Hybrid Learning of RBF Networks*, Neural Network World, 12, no. 6 (2002), pages 573-585, ISSN 1210-0552

Chapters

Vidnerová, Petra - Suchopárová, Gabriela - Neruda, Roman, *Simulace epidemiologických opatření v multiagentním modelu*, Rok s pandemií covid-19, pages 87-96, ISBN 978-80-246-5273-3

Kalina, Jan - Vidnerová, Petra - Soukup, Lubomír, *Modern Approaches to Statistical Estimation of Measurements in the Location Model and Regression*, Handbook of Metrology and Applications, First Online: 23 July 2022, ISBN 978-981-19-1550-5

Kalina, Jan - Vidnerová, Petra, *Properties of the weighted and robust implicitly weighted correlation coefficients*, Proceedings of the ICANN 2023 Thirty-Second International Conference on Artificial Neural Networks (INPRINT)

Šíma, Jiří - Vidnerová, Petra - Mrázek, V., *Energy Complexity Model for Convolutional Neural Networks (to appear)*, Proceedings of the ICANN 2023 Thirty-Second International Conference on Artificial Neural Networks (INPRINT)

Vidnerová, Petra - Kalina, Jan, *Multi-objective Bayesian Optimization for Neural Architecture Search*, Artificial Intelligence and Soft Computing. 21st International Conference, ICAISC 2022. Proceedings, Part I, pages 144-153, ISBN 978-3-031-23491-0, ISSN 0302-9743

Suchopárová, Gabriela - Vidnerová, Petra - Neruda, Roman - Šmíd, Martin, *Using a Deep Neural Network in a Relative Risk Model to Estimate Vaccination Protection for COVID-19*, Engineering Applications of Neural Networks, pages 310-320, ISBN 978-3-031-08222-1, ISSN 1865-0929

Kalina, Jan - Vidnerová, Petra - Janáček, Patrik, *Sparse Versions of Optimized Centroids*, 2022 International Joint Conference on Neural Networks (IJCNN) Proceedings, pages 1-7, ISBN 978-1-7281-8671-9

Kalina, Jan - Vidnerová, Petra, *Application Of Implicitly Weighted Regression Quantiles: Analysis Of The 2018 Czech Presidential Election*, RELIK 2021. Conference Proceedings, pages 332-341, ISBN 978-80-245-2429-0

Kalina, Jan - Vidnerová, Petra - Tichavský, Jan, *A Comparison of Trend Estimators under Heteroscedasticity*, Artificial Intelligence and Soft Computing. ICAISC 2021 Proceedings, Part I, pages 89-98, ISBN 978-3-030-87985-3, ISSN 0302-9743

Kalina, Jan - Vidnerová, Petra, *On kernel-based nonlinear regression estimation*, The 15th International Days of Statistics and Economics Conference Proceedings, pages 450-459, ISBN 978-80-87990-25-4

Vidnerová, Petra - Neruda, Roman - Suchopárová, Gabriela - Berec, L. - Diviák, T. - Kuběna, Aleš Antonín - Levínský, René - Šlerka, J. - Šmíd, Martin - Trnka, J. - Tuček, V. - Vrbenský, Karel - Zajíček, Milan, *Simulation of non-pharmaceutical interventions in an agent based epidemic model*, Proceedings of the 21st Conference Information Technologies – Applications and Theory (ITAT 2021), pages 263-268, ISSN 1613-0073

Vidnerová, Petra - Kalina, Jan - Güney, Y., *A Comparison of Robust Model Choice Criteria Within a Metalearning Study*, Analytical Methods in Statistics, pages 125-141, ISBN 978-3-030-48813-0

Vidnerová, Petra - Neruda, Roman, *Multi-objective Evolution for Deep Neural Network Architecture Search*, Neural Information Processing. ICONIP 2020 Proceedings, Part III, pages 270-281, ISBN 978-3-030-63835-1, ISSN 0302-9743

Vidnerová, Petra - Procházka, Štěpán - Neruda, Roman, *Multiobjective Evolution for Convolutional Neural Network Architecture Search*, Artificial Intelligence and Soft Computing. ICAISC 2020 Proceedings, Part I, pages 261-270, ISBN 978-3-030-61400-3, ISSN 0302-9743

Vidnerová, Petra - Kalina, Jan, *Least Weighted Absolute Value Estimator with an Application to Investment Data*, The 14th International Days of Statistics and Economics Conference Proceedings, pages 1357-1366, ISBN 978-80-87990-22-3

Kalina, Jan - Vidnerová, Petra, *Robust Multilayer Perceptrons: Robust Loss Functions*

and Their Derivatives, Proceedings of the 21st EANN (Engineering Applications of Neural Networks) 2020 Conference, pages 546-557, ISBN 978-3-030-48790-4, ISSN 2661-8141

Kalina, Jan - Vidnerová, Petra, *Regression Neural Networks with a Highly Robust Loss Function*, Analytical Methods in Statistics, pages 17-29, ISBN 978-3-030-48813-0

Kalina, Jan - Vidnerová, Petra, *Regression for High-Dimensional Data: From Regularization to Deep Learning*, The 14th International Days of Statistics and Economics Conference Proceedings, pages 418-427, ISBN 978-80-87990-22-3

Kalina, Jan - Vidnerová, Petra, *On Robust Training of Regression Neural Networks*, Functional and High-Dimensional Statistics and Related Fields, pages 145-152, ISBN 978-3-030-47755-4, ISSN 1431-1968

Kalina, Jan - Vidnerová, Petra, *A Metalearning Study for Robust Nonlinear Regression*, Proceedings of the 21st EANN (Engineering Applications of Neural Networks) 2020 Conference, pages 499-510, ISBN 978-3-030-48790-4, ISSN 2661-8141

Kalina, Jan - Vidnerová, Petra, *Implicitly weighted robust estimation of quantiles in linear regression*, Conference Proceedings. 37th International Conference on Mathematical Methods in Economics 2019, pages 25-30, ISBN 978-80-7394-760-6

Kalina, Jan - Vidnerová, Petra, *Robust Training of Radial Basis Function Neural Networks*, Artificial Intelligence and Soft Computing. Proceedings, Part I, pages 113-124, ISBN 978-3-030-20911-7, ISSN 0302-9743

Vidnerová, Petra - Neruda, Roman, *Asynchronous Evolution of Convolutional Networks*, ITAT 2018: Information Technologies – Applications and Theory. Proceedings of the 18th conference ITAT 2018, pages 80-85, ISSN 1613-0073

Vidnerová, Petra - Neruda, Roman, *Deep Networks with RBF Layers to Prevent Adversarial Examples*, Artificial Intelligence and Soft Computing, pages 257-266, ISBN 978-3-319-91252-3, ISSN 0302-9743

Vidnerová, Petra - Neruda, Roman, *Evolving Keras Architectures for Sensor Data Analysis*, Proceedings of the 2017 Federated Conference on Computer Science and Information Systems, pages 109-112, ISBN 978-83-946253-7-5, ISSN 2300-5963

Vidnerová, Petra - Neruda, Roman, *Evolution Strategies for Deep Neural Network Models Design*, Proceedings ITAT 2017: Information Technologies - Applications and Theory, pages 159-166, ISBN 978-1974274741, ISSN 1613-0073

Vidnerová, Petra - Neruda, Roman, *Sensor Data Air Pollution Prediction by Kernel Models*, Proceedings og the 16th IEEE/ACM International Symposium on Cluster, Cloud, and Grid Computing, pages 666-673, ISBN 978-1-5090-2453-7

Vidnerová, Petra - Neruda, Roman, *Evolutionary Generation of Adversarial Examples for Deep and Shallow Machine Learning Models*, Proceedings of the The 3rd Multidisciplinary International Social Networks Conference on SocialInformatics 2016, Data Science 2016, ISBN 978-1-4503-4129-5

Vidnerová, Petra - Neruda, Roman, *Vulnerability of Machine Learning Models to Adversarial Examples*, Proceedings ITAT 2016: Information Technologies - Applications and Theory, pages 187-194, ISBN 978-1-5370-1674-0, ISSN 1613-0073

Vidnerová, Petra - Neruda, Roman, *Product Multi-kernels for Sensor Data Analysis*, Artificial Intelligence and Soft Computing, pages 123-133, ISBN 978-3-319-19323-6, ISSN 0302-9743

Vidnerová, Petra - Neruda, Roman, *Meta-Parameters of Kernel Methods and Their*

Optimization, ITAT 2014. Information Technologies - Applications and Theory. Part II, pages 99-105, ISBN 978-80-87136-19-5

Vidnerová, Petra - Neruda, Roman, *Evolving Sum and Composite Kernel Functions for Regularization Networks*, Adaptive and Natural Computing Algorithms. Part I, pages 180-189, ISBN 978-3-642-20281-0, ISSN 0302-9743

Vidnerová, Petra - Neruda, Roman, *Evolutionary learning of regularization networks with product kernel units*, Systems, Man and Cybernetics, pages 638-643, ISBN 978-1-4577-0652-3, ISSN 1062-922X

Vidnerová, Petra - Neruda, Roman, *Evolutionary Learning of Regularization Networks with Multi-kernel Units*, Advances in Neural Networks – ISNN 2011. Part I, pages 538-546, ISBN 978-3-642-21104-1, ISSN 0302-9743

Neruda, Roman - Vidnerová, Petra, *Memetic Evolutionary Learning for Local Unit Networks*, Advances in Neural Networks – ISNN 2010, pages 534-541, ISBN 978-3-642-13277-3, ISSN 0302-9743

Neruda, Roman - Vidnerová, Petra, *Genetic Algorithm with Species for Regularization Network Metalearning*, Advances in Information Technology, pages 192-201, ISBN 978-3-642-16698-3, ISSN 1865-0929

Vidnerová, Petra - Neruda, Roman, *Genetic Algorithm with Species for Regularization Network Metalearning*, Informačné Technológie - Aplikácie a Teória, pages 111-116, ISBN 978-80-970179-3-4

Vidnerová, Petra - Neruda, Roman, *Hybrid Learning of Regularization Neural Networks*, Artificial Intelligence and Soft Computing, pages 124-131, ISBN 978-3-642-13231-5, ISSN 0302-9743

Slušný, Stanislav - Neruda, Roman - Vidnerová, Petra, *Localization with a Low-Cost Robot*, Information Technologies - Applications and Theory, pages 77-80, ISBN 978-80-970179-2-7

Vidnerová, Petra - Slušný, Stanislav - Neruda, Roman, *Evolutionary Trained Radial Basis Function Networks for Robot Control*, Control, Automation, Robotics and Vision, pages 833-838, ISBN 978-1-4244-2286-9

Vidnerová, Petra - Slušný, Stanislav - Neruda, Roman, *Emergence chování robotických agentů: neuroevoluce*, Kognice a umělý život VIII, pages 363-369, ISBN 978-80-7248-462-1

Vidnerová, Petra - Neruda, Roman, *Testing Error Estimates for Regularization and Radial Function Networks*, Advances in Neural Networks - ISNN 2008, pages 549-554, ISBN 978-3-540-87731-8

Gemrot, J. - Kadlec, R. - Brom, C. - Vidnerová, Petra, *Evoluce chování agentů v 3D prostředí*, Informačné technológie - Aplikácie a teória, pages 3-10, ISBN 978-80-969184-8-5

Slušný, Stanislav - Neruda, Roman - Vidnerová, Petra, *Comparison of RBF Network Learning and Reinforcement Learning on the Maze Exploration Problem*, Artificial Neural Networks - ICANN 2008, pages 720-729, ISBN 978-3-540-87535-2

Slušný, Stanislav - Neruda, Roman - Vidnerová, Petra, *Learning Algorithms for Small Mobile Robots: Case Study on Maze Exploration*, Information Technologies - Applications and Theory, pages 49-54, ISBN 978-80-969184-9-2

Slušný, Stanislav - Vidnerová, Petra - Neruda, Roman, *Emergencia chovania robotických agentov: učenie posilovaním*, Kognice a umělý život VIII, pages 295-299, ISBN 978-80-

7248-462-1

Neruda, Roman - Slušný, Stanislav - Vidnerová, Petra, *Two Learning Approaches to Maze Exploration: Case Study with E-puck Mobile Robots*, World Congress on Engineering and Computer Science, pages 655-660, ISBN 978-988-98671-0-2

Neruda, Roman - Vidnerová, Petra, *Supervised Learning Errors by Radial Basis Function Neural Networks and Regularization Networks*, Proceedings of Second International Conference on Future Generation Communication and Networking Symposia, pages 193-196, ISBN 978-1-4244-3430-5

Neruda, Roman - Slušný, Stanislav - Vidnerová, Petra, *Performance Comparison of Relational Reinforcement Learning and RBF Neural Networks for Small Mobile Robots*, Proceedings of Second International Conference on Future Generation Communication and Networking Symposia, pages 29-32, ISBN 978-1-4244-3430-5

Slušný, Stanislav - Neruda, Roman - Vidnerová, Petra, *Rule-based Analysis of Behaviour Learned by Evolutionary and Reinforcement Algorithms*, Advanced Intelligent Computing Theories and Applications With Aspects of Artificial Intelligence, pages 284-291, ISBN 978-3-540-85983-3

Neruda, Roman - Slušný, Stanislav - Vidnerová, Petra, *Evolution of Simple Behavior Patterns for Autonomous Robotic Agent*, System Science and Simulation in Engineering, pages 411-417, ISBN 978-960-6766-14-5

Kudová, Petra, *Clustering Genetic Algorithm*, Database and Expert Systems Applications, pages 138-142, ISBN 978-0-7695-2932-5

Kudová, Petra, *Clustering using Genetic Algorithms*, Evolutionary Techniques in Dataprocessing, pages 1-11, ISBN 978-80-248-1332-5

Vidnerová, Petra, *Learning with Regularization Networks Mixtures*, Information Technologies - Applications and Theory, pages 109-113, ISBN 978-80-969184-7-8

Slušný, Stanislav - Vidnerová, Petra - Neruda, Roman, *Testing Different Evolutionary Neural Networks for Autonomous Robot Control*, Information Technologies - Applications and Theory, pages 103-108, ISBN 978-80-969184-7-8

Slušný, Stanislav - Vidnerová, Petra - Neruda, Roman, *Behavior Emergence in Autonomous Robot control by Means of Feedforward and Reccurent Neural Networks*, WCECS 2007, pages 518-523, ISBN 978-988-98671-6-4

Slušný, Stanislav - Neruda, Roman - Vidnerová, Petra, *Behaviour Patterns Evolution on Individual and Group Level*, Computational Intelligence, Man-Machine Systems and Cybernetics, pages 24-29, ISBN 978-960-6766-21-3

Řezanková, H. - Húsek, Dušan - Kudová, Petra - Snášel, V., *Comparison of some Approaches to Clustering Categorical Data*, Proceedings in Computational Statistics, pages 607-613, ISBN 3-7908-1708-2

Kudová, Petra, *The Role of Kernel Function in Regularization Network*, Information Technologies - Applications and Theory, pages 101-105, ISBN 80-969184-4-3

Kudová, Petra - Šámalová, Terezie, *Sum and Product Kernel Regularization Networks*, Artificial Intelligence and Soft Computing – ICAISC 2006, pages 56-65, ISBN 3-540-35748-3

Kudová, Petra - Řezanková, H. - Húsek, Dušan - Snášel, V., *Categorical Data Clustering using Statistical Methods and Neural Networks*, Spring Young Researches' Colloquium on Database and Information Systems, pages 19-23

Neruda, M. - Neruda, Roman - Kudová, Petra, *Forecasting Runoff with Artificial Neural*

Networks, Progress in Surface and Subsurface Water Studies at Plot and Small Basin Scale, pages 65-69

Kudová, Petra - Šámalová, Terezie, *Product Kernel Regularization Networks*, Adaptive and Natural Computing Algorithms, pages 433-436, ISBN 3-211-24934-6

Kudová, Petra, *Learning with Kernel Based Regularization Methods*, ITAT 2005. Information Technologies - Applications and Theory, pages 83-92, ISBN 80-7097-609-8

Kudová, Petra - Neruda, Roman, *Kernel Based Learning Methods: Regularization Networks and RBF Networks*, Deterministic and Statistical Methods in Machine Learning, pages 124-136, ISBN 3-540-29073-7

Kudová, Petra, *Comparison of Kernel Based Regularization Networks and RBF Networks*, ITAT 2004. Information Technologies - Applications and Theory, pages 59-68, ISBN 80-7097-589-X

Neruda, Roman - Krušina, Pavel - Kudová, Petra - Rydvan, Pavel - Beuster, G., *Bang 3: A Computational Multi-Agent System*, Intelligent Agent Technology, pages 563-564, ISBN 0-7695-2101-0

Neruda, Roman - Kudová, Petra, *Hybrid Learning of RBF Networks*, Computational Science, pages 594-603, ISBN 3-540-43594-8, ISSN 0302-9743

Other

Vidnerová, Petra. *Hitoshi Iba: Evolutionary approach to machine learning and deep neural networks: neuro-evolution and gene regulatory networks (review)*, Genetic Programming and Evolvable Machines. 2019, 20(2), 151-153, ISSN 1389-2576, E-ISSN 1573-7632

Software

Coufal, David - Hakl, František - Vidnerová, Petra, *General-purpose Library of ML/AI Methods*, 2022, https://github.com/PetraVidnerova/nck_python

Coufal, David - Hakl, František - Vidnerová, Petra, *General-purpose Library of ML/AI Methods for CUDA Cores*, 2022, https://github.com/PetraVidnerova/nck_matlab

Berec, Luděk - Diviák, T. - Kuběna, Aleš Antonín - Levínský, René - Neruda, Roman - Suchopárová, Gabriela - Šlerka, J. - Šmíd, Martin - Trnka, Jan - Tuček, Vít - Vidnerová, Petra - Vrbenský, Karel - Zajíček, Milan - Zapletal, František, *Epicity*, 2021, https://github.com/epicity-cz/model-m/releases/tag/v1.0

Coufal, David - Hakl, František - Vidnerová, Petra, *General-purpose algorithms for machine learning*, 2020, https://github.com/epicity-cz/model-m/releases/tag/v1.0

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DESCRIPTION OF SELECTED RESULTS

LEARNING ALGORITHMS FOR RBF NETWORKS

In the 1990s and early 21st century, the field of machine learning was dominated by the so-called kernel methods. Among these, we can include the highly popular Radial Basis Function Networks (RBF networks).

As part of my doctoral thesis, I delved into these methods. One of the primary outcomes [1] was the proposal of several algorithms for training RBF networks and an analysis of these algorithms. All methods were implemented and experiments were conducted to demonstrate the relationship between the training time and the accuracy of the results.

[1] R. Neruda, P. Kudová. Learning Methods for Radial Basis Functions Networks. Future Generation Computer Systems. 21. (2005), p. 1131-1142. ISSN 0167-739X https://dl.acm.org/doi/10.5555/1088377.1708275

GENERATING OF ADVERSARIAL EXAMPLES AND THEIR ANALYSIS

In recent years, the question of the security and reliability of artificial intelligence algorithms has gained significant attention. This is closely related to the concept of "adversarial" patterns, which are intentionally created patterns designed to deceive a given classification model. For instance, in image classification, an adversarial pattern may appear indistinguishable from the original image to the human eye, yet a properly trained model may classify it incorrectly.

In our article [2], we have contributed to the understanding of adversarial patterns, particularly emphasizing that they are not limited to neural networks but apply to a wide range of classifiers, from SVMs to decision trees. To address this issue, we have introduced our own evolutionary algorithm for adversarial patterns crafting. Its notable feature is its "black-box" approach, meaning it doesn't require knowledge of the model's internal settings and structure. As a result, it can be employed to undermine (in the context of adversarial patterns) virtually any classification model.

Furthermore, through our experiments, we have demonstrated that certain adversarial patterns can be transferred between models, particularly when dealing with models of similar nature (e.g., two neural networks with similar architectures).

Additionally, we have shown that networks equipped with local units (e.g., RBF networks) exhibit higher resilience against adversarial patterns.

[2] P. Vidnerová, R. Neruda. Vulnerability of classifiers to evolutionary generated adversarial examples, Neural Networks, Volume 127, 2020.
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EPIDEMIC MODELING - MULTI-AGENT SYSTEM MODEL M

In 2020, I joined a group of scientists focused on modeling the spread of the COVID-19 disease. One of the key outcomes is a multi-agent model named Model M [3], along with software [4] that enables experimentation with the model.

The model operates with a realistic network graph and allows for simulating a wide range of interventions, such as global contact restrictions, quarantines, and contact tracing.

The model is designed modularly, allowing for diverse application deployments. The model was used in a study on virus transmission in schools in collaboration with the Ministry of Education, Youth, and Sports of the Czech Republic.

I contributed to the model's design, implementation, and experiments.

[3] Berec, et al. On the Contact Tracing for COVID-19: A simulation study. Epidemics, Volume 43, (2023), ISSN 1755-4365. https://doi.org/10.1016/j.epidem.2023.100677

[4] Berec, et al. *Epicity*, 2021, https://github.com/epicity-cz/model-m/releases/tag/v1.0