



List of Publications

Author: Ing. Václav Mácha
Supervisor: doc. Ing Václav Šmídl, Ph.D.
Supervisor Specialist: Mgr. Lukáš Adam, Ph.D.
Academic Year: 2022/2023

Publication related to the doctoral thesis:

reviewed

1. Lukáš Adam and V Mácha. “Projections onto the canonical simplex with additional linear inequalities”. In: *Optimization Methods and Software* (2020), pp. 1–29
(**??? citations**)
2. Lukáš Adam et al. “General framework for binary classification on top samples”. In: *Optimization Methods and Software* (2021), pp. 1–32
(**??? citations**)

non reviewed

3. Václav Mácha, Lukáš Adam, and Václav Šmídl. “Nonlinear classifiers for ranking problems based on kernelized SVM”. in: *arXiv preprint arXiv:2002.11436* (2020)
(**??? citations**)
4. Lukáš Adam, Václav Mácha, and Václav Šmídl. “DeepTopPush: Simple and Scalable Method for Accuracy at the Top”. In: *arXiv preprint arXiv:2006.12293* (2020)
(**??? citations**)

Other publications:

reviewed

5. Václav Šmídl et al. “Predictive current limiter for LQ based control of AC drives”. In: *2015 IEEE International Symposium on Predictive Control of Electrical Drives and Power Electronics (PRECEDE)*. IEEE. 2015, pp. 55–60
(**??? citations**)

6. Václav Šmídl et al. "Analysis of cost functions and setpoints for predictive speed control of PMSM drives". In: *2016 18th European Conference on Power Electronics and Applications (EPE'16 ECCE Europe)*. IEEE. 2016, pp. 1–8
(??? citations)
7. Václav Mácha, Václav Šmídl, and Zdeněk Peroutka. "Implementation of predictive spectrum control of a lc filter using admm". In: *2017 IEEE International Symposium on Predictive Control of Electrical Drives and Power Electronics (PRECEDE)*. IEEE. 2017, pp. 78–82
(??? citations)

Bibliography

- [1] Lukáš Adam and Martin Branda. *Machine learning approach to chance-constrained problems: An algorithm based on the stochastic gradient descent*. 2019. DOI: [10.48550/ARXIV.1905.10986](https://doi.org/10.48550/ARXIV.1905.10986). URL: <https://arxiv.org/abs/1905.10986>.
- [2] Lukáš Adam and V Mácha. “Projections onto the canonical simplex with additional linear inequalities”. In: *Optimization Methods and Software* (2020), pp. 1–29.
- [3] Lukáš Adam, Václav Mácha, and Václav Šmídl. “DeepTopPush: Simple and Scalable Method for Accuracy at the Top”. In: *arXiv preprint arXiv:2006.12293* (2020).
- [4] Lukáš Adam et al. “General framework for binary classification on top samples”. In: *Optimization Methods and Software* (2021), pp. 1–32.
- [5] Shivani Agarwal. “The infinite push: A new support vector ranking algorithm that directly optimizes accuracy at the absolute top of the list”. In: *Proceedings of the 2011 SIAM International Conference on Data Mining*. SIAM. 2011, pp. 839–850.
- [6] Shivani Agarwal et al. “Generalization Bounds for the Area Under the ROC Curve.” In: *Journal of Machine Learning Research* 6.4 (2005).
- [7] Charu C Aggarwal. *Artificial Intelligence-A Textbook*. Springer, 2021.
- [8] Charu C Aggarwal. “Data classification”. In: *Data Mining*. Springer. 2015, pp. 285–344.
- [9] Francis R. Bach, David Heckerman, and Eric Horvitz. “Considering Cost Asymmetry in Learning Classifiers”. In: *Journal of Machine Learning Research* 7 (2006), pp. 1713–1741.
- [10] Pierre Baldi et al. “Parameterized neural networks for high-energy physics”. In: *The European Physical Journal C* 76.5 (2016), p. 235.
- [11] Pierre Baldi et al. “Parameterized neural networks for high-energy physics”. In: *The European Physical Journal C* 76.5 (2016), p. 235.
- [12] Zeynep Batmaz et al. “A review on deep learning for recommender systems: challenges and remedies”. In: *Artificial Intelligence Review* 52.1 (2019), pp. 1–37.
- [13] Jeff Bezanson et al. “Julia: A fresh approach to numerical computing”. In: *SIAM review* 59.1 (2017), pp. 65–98.
- [14] Bernhard E Boser, Isabelle M Guyon, and Vladimir N Vapnik. “A training algorithm for optimal margin classifiers”. In: *Proceedings of the fifth annual workshop on Computational learning theory*. 1992, pp. 144–152.
- [15] Léon Bottou. “Large-scale machine learning with stochastic gradient descent”. In: *Proceedings of COMPSTAT’2010*. Springer, 2010, pp. 177–186.
- [16] Léon Bottou, Frank E Curtis, and Jorge Nocedal. “Optimization methods for large-scale machine learning”. In: *Siam Review* 60.2 (2018), pp. 223–311.

- [17] Stephen Boyd and Lieven Vandenberghe. *Convex optimization*. Cambridge university press, 2004.
- [18] Stephen Boyd et al. “Accuracy at the top”. In: *Advances in neural information processing systems*. 2012, pp. 953–961.
- [19] Andrew P Bradley. “The use of the area under the ROC curve in the evaluation of machine learning algorithms”. In: *Pattern recognition* 30.7 (1997), pp. 1145–1159.
- [20] Kay Henning Brodersen et al. “The balanced accuracy and its posterior distribution”. In: *2010 20th international conference on pattern recognition*. IEEE. 2010, pp. 3121–3124.
- [21] Chih-Chung Chang and Chih-Jen Lin. “LIBSVM: a library for support vector machines”. In: *ACM transactions on intelligent systems and technology (TIST)* 2.3 (2011), pp. 1–27.
- [22] Kai-Wei Chang, Cho-Jui Hsieh, and Chih-Jen Lin. “Coordinate descent method for large-scale l2-loss linear support vector machines”. In: *Journal of Machine Learning Research* 9.Jul (2008), pp. 1369–1398.
- [23] F. H. Clarke et al. *Nonsmooth Analysis and Control Theory*. Berlin, Heidelberg: Springer-Verlag, 1998.
- [24] Rémi Cogranne, Quentin Giboulot, and Patrick Bas. “Steganography by minimizing statistical detectability: The cases of JPEG and color images”. In: *Proceedings of the 2020 ACM Workshop on Information Hiding and Multimedia Security*. 2020, pp. 161–167.
- [25] Corinna Cortes and Mehryar Mohri. “AUC optimization vs. error rate minimization”. In: *Advances in neural information processing systems* 16 (2003).
- [26] Corinna Cortes and Vladimir Vapnik. “Support-vector networks”. In: *Machine learning* 20.3 (1995), pp. 273–297.
- [27] Paulo Cortez et al. “Modeling wine preferences by data mining from physicochemical properties”. In: *Decision Support Systems* 47.4 (2009), pp. 547–553.
- [28] Andrew Cotter et al. “Optimization with Non-Differentiable Constraints with Applications to Fairness, Recall, Churn, and Other Goals.” In: *Journal of Machine Learning Research* 20.172 (2019), pp. 1–59.
- [29] Koby Crammer and Yoram Singer. “Pranking with ranking”. In: *Advances in neural information processing systems*. 2002, pp. 641–647.
- [30] Jesse Davis and Mark Goadrich. “The relationship between Precision-Recall and ROC curves”. In: *Proceedings of the 23rd international conference on Machine learning*. ACM. 2006, pp. 233–240.
- [31] Janez Demšar. “Statistical comparisons of classifiers over multiple data sets”. In: *Journal of Machine learning research* 7 (2006), pp. 1–30.
- [32] Li Deng. “The mnist database of handwritten digit images for machine learning research”. In: *IEEE Signal Processing Magazine* 29.6 (2012), pp. 141–142.
- [33] Dheeru Dua and Casey Graff. *UCI Machine Learning Repository*. 2017. URL: <http://archive.ics.uci.edu/ml>.
- [34] Elad ET Eban et al. “Scalable Learning of Non-Decomposable Objectives”. In: *Artificial Intelligence and Statistics*. 2017, pp. 832–840.
- [35] James P Egan and James Pendleton Egan. *Signal detection theory and ROC-analysis*. Academic press, 1975.

- [36] Martin Engilberge et al. "SoDeep: a Sorting Deep net to learn ranking loss surrogates". In: *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*. 2019, pp. 10792–10801.
- [37] Rizal Fathony and J Zico Kolter. "AP-Perf: Incorporating Generic Performance Metrics in Differentiable Learning". In: *Proceedings of the 23rd International Conference on Artificial Intelligence and Statistics (AISTATS)*. 2020.
- [38] Tom Fawcett. "An introduction to ROC analysis". In: *Pattern recognition letters* 27.8 (2006), pp. 861–874.
- [39] Yoav Freund and Robert E Schapire. "A decision-theoretic generalization of on-line learning and an application to boosting". In: *Journal of computer and system sciences* 55.1 (1997), pp. 119–139.
- [40] Yoav Freund et al. "An efficient boosting algorithm for combining preferences". In: *The Journal of machine learning research* 4 (2003), pp. 933–969.
- [41] Jessica Fridrich, Tomáš Pevný, and Jan Kodovský. "Statistically undetectable jpeg steganography: dead ends challenges, and opportunities". In: *Proceedings of the 9th workshop on Multimedia & security*. 2007, pp. 3–14.
- [42] Milton Friedman. "A comparison of alternative tests of significance for the problem of m rankings". In: *The Annals of Mathematical Statistics* 11.1 (1940), pp. 86–92.
- [43] Sebastian Garcia et al. "An empirical comparison of botnet detection methods". In: *Computers & Security* 45 (2014), pp. 100–123.
- [44] Giorgio Giacinto and Fabio Roli. "Intrusion detection in computer networks by multiple classifier systems". In: *Object recognition supported by user interaction for service robots*. Vol. 2. IEEE. 2002, pp. 390–393.
- [45] Peter W. Glynn. "Importance Sampling For Monte Carlo Estimation Of Quantiles". In: *Proc. 2nd St. Petersburg Workshop on Simulation*. St Petersburg, Russia: Publishing House of Saint Petersburg University, 1996, pp. 180–185.
- [46] Martin Grill. "Automatic Intrusion Detection in Computer Networks". In: *Bachelor's Thesis* (2008).
- [47] Martin Grill and Tomáš Pevný. "Learning combination of anomaly detectors for security domain". In: *Computer Networks* 107 (2016), pp. 55–63.
- [48] Isabelle Guyon et al. "Result analysis of the NIPS 2003 feature selection challenge". In: *Advances in neural information processing systems*. 2005, pp. 545–552.
- [49] James A Hanley and Barbara J McNeil. "The meaning and use of the area under a receiver operating characteristic (ROC) curve." In: *Radiology* 143.1 (1982), pp. 29–36.
- [50] Mohammad Hossin and Md Nasir Sulaiman. "A review on evaluation metrics for data classification evaluations". In: *International journal of data mining & knowledge management process* 5.2 (2015), p. 1.
- [51] Cho-Jui Hsieh et al. "A dual coordinate descent method for large-scale linear SVM". In: *Proceedings of the 25th international conference on Machine learning*. ACM. 2008, pp. 408–415.
- [52] Michael Innes et al. "Fashionable Modelling with Flux". In: CoRR abs/1811.01457 (2018). arXiv: [1811.01457](https://arxiv.org/abs/1811.01457). URL: <https://arxiv.org/abs/1811.01457>.
- [53] Mike Innes. "Flux: Elegant Machine Learning with Julia". In: *Journal of Open Source Software* (2018). DOI: [10.21105/joss.00602](https://doi.org/10.21105/joss.00602).

- [54] Thorsten Joachims. “A Support Vector Method for Multivariate Performance Measures”. In: *Proceedings of the 22nd International Conference on Machine Learning*. ICML ’05. Bonn, Germany: ACM, 2005, pp. 377–384.
- [55] Thorsten Joachims. “Optimizing search engines using clickthrough data”. In: *Proceedings of the eighth ACM SIGKDD international conference on Knowledge discovery and data mining*. 2002, pp. 133–142.
- [56] Frederick Kaefer, Carrie M Heilman, and Samuel D Ramenofsky. “A neural network application to consumer classification to improve the timing of direct marketing activities”. In: *Computers & Operations Research* 32.10 (2005), pp. 2595–2615.
- [57] Takafumi Kanamori, Akiko Takeda, and Taiji Suzuki. “Conjugate relation between loss functions and uncertainty sets in classification problems”. In: *The Journal of Machine Learning Research* 14.1 (2013), pp. 1461–1504.
- [58] Purushottam Kar, Harikrishna Narasimhan, and Prateek Jain. “Surrogate functions for maximizing precision at the top”. In: *International Conference on Machine Learning*. 2015, pp. 189–198.
- [59] Diederik Kingma and Jimmy Ba. “Adam: A method for stochastic optimization”. In: *arXiv preprint arXiv:1412.6980* (2014).
- [60] Jan Kodovský and Jessica Fridrich. “Steganalysis of JPEG images using rich models”. In: *Media Watermarking, Security, and Forensics 2012*. Vol. 8303. SPIE. 2012, pp. 81–93.
- [61] Alex Krizhevsky, Geoffrey Hinton, et al. *Learning multiple layers of features from tiny images*. Citeseer, 2009.
- [62] Abhishek Kumar, Harikrishna Narasimhan, and Andrew Cotter. “Implicit rate-constrained optimization of non-decomposable objectives”. In: *Proceedings of the 38th International Conference on Machine Learning*. Ed. by Marina Meila and Tong Zhang. Vol. 139. Proceedings of Machine Learning Research. PMLR, 2021, pp. 5861–5871.
- [63] Maksim Lapin, Matthias Hein, and Bernt Schiele. “Analysis and optimization of loss functions for multiclass, top-k, and multilabel classification”. In: *IEEE transactions on pattern analysis and machine intelligence* 40.7 (2018), pp. 1533–1554.
- [64] Maksim Lapin, Matthias Hein, and Bernt Schiele. “Top-k multiclass SVM”. In: *Advances in Neural Information Processing Systems*. 2015, pp. 325–333.
- [65] Yann LeCun et al. “Gradient-based learning applied to document recognition”. In: *Proceedings of the IEEE* 86.11 (1998), pp. 2278–2324.
- [66] Daniel Lévy and Arzav Jain. “Breast mass classification from mammograms using deep convolutional neural networks”. In: *arXiv preprint arXiv:1612.00542* (2016).
- [67] Nan Li, Rong Jin, and Zhi-Hua Zhou. “Top rank optimization in linear time”. In: *Advances in neural information processing systems*. NIPS’14. Montreal, Canada: MIT Press, 2014, pp. 1502–1510.
- [68] Zhi-Quan Luo, Jong-Shi Pang, and Daniel Ralph. *Mathematical programs with equilibrium constraints*. Cambridge University Press, 1996.
- [69] Junshui Ma et al. “Deep neural nets as a method for quantitative structure–activity relationships”. In: *Journal of chemical information and modeling* 55.2 (2015), pp. 263–274.
- [70] Václav Mácha, Lukáš Adam, and Václav Šmídl. “Nonlinear classifiers for ranking problems based on kernelized SVM”. In: *arXiv preprint arXiv:2002.11436* (2020).

- [71] Václav Mácha, Václav Šmídl, and Zdeněk Peroutka. "Implementation of predictive spectrum control of a lc filter using admm". In: *2017 IEEE International Symposium on Predictive Control of Electrical Drives and Power Electronics (PRECEDE)*. IEEE. 2017, pp. 78–82.
- [72] Alan Mackey, Xiyang Luo, and Elad Eban. "Constrained Classification and Ranking via Quantiles". In: *arXiv preprint arXiv:1803.00067* (2018).
- [73] Simon Mandlik et al. "Mill. jl and JsonGrinder. jl: automated differentiable feature extraction for learning from raw JSON data". In: *arXiv preprint arXiv:2105.09107* (2021).
- [74] Charles E Metz. "Basic principles of ROC analysis". In: *Seminars in nuclear medicine*. Vol. 8. Elsevier. 1978, pp. 283–298.
- [75] Tom M Mitchell and Tom M Mitchell. *Machine learning*. Vol. 1. 9. McGraw-hill New York, 1997.
- [76] Tayana Morkel, Jan HP Eloff, and Martin S Olivier. "An overview of image steganography." In: *ISSA*. 2. 2005, pp. 1–11.
- [77] Harikrishna Narasimhan, Andrew Cotter, and Maya Gupta. "Optimizing generalized rate metrics with three players". In: *Advances in Neural Information Processing Systems*. 2019, pp. 10747–10758.
- [78] Peter Bjorn Nemenyi. *Distribution-free multiple comparisons*. Princeton University, 1963.
- [79] Yuval Netzer et al. "Reading digits in natural images with unsupervised feature learning". In: *Advances in neural information processing systems*. NIPS'11. 2011, pp. 1502–1510.
- [80] Jerzy Neyman and Egon Sharpe Pearson. "IX. On the problem of the most efficient tests of statistical hypotheses". In: *Philosophical Transactions of the Royal Society of London. Series A, Containing Papers of a Mathematical or Physical Character* 231.694–706 (1933), pp. 289–337.
- [81] Jerzy Neyman and Egon Sharpe Pearson. "On the problem of the most efficient tests of statistical hypotheses". In: *Philosophical Transactions of the Royal Society of London. Series A, Containing Papers of a Mathematical or Physical Character* 231.694–706 (1933), pp. 289–337.
- [82] Jorge Nocedal and Stephen Wright. *Numerical optimization*. Springer Science & Business Media, 2006.
- [83] Kohei Ogawa, Yoshiki Suzuki, and Ichiro Takeuchi. "Safe screening of non-support vectors in pathwise SVM computation". In: *International conference on machine learning*. 2013, pp. 1382–1390.
- [84] Wlodzimierz Ogryczak and Arie Tamir. "Minimizing the sum of the k largest functions in linear time". In: *Information Processing Letters* 85.3 (2003), pp. 117–122.
- [85] Patrick Pantel, Dekang Lin, et al. "Spamcop: A spam classification & organization program". In: *Proceedings of AAAI-98 Workshop on Learning for Text Categorization*. 1998, pp. 95–98.
- [86] Tomáš Pevný and Petr Somol. "Using neural network formalism to solve multiple-instance problems". In: *International Symposium on Neural Networks*. Springer. 2017, pp. 135–142.

- [87] Alain Rakotomamonjy. “Sparse support vector infinite push”. In: *Proceedings of the 29th International Conference on Machine Learning*. ICML '12. Edinburgh, Scotland: ACM, 2012, pp. 339–346.
- [88] Martin Rehák et al. “Adaptive multiagent system for network traffic monitoring”. In: *IEEE Intelligent Systems* 3 (2009), pp. 16–25.
- [89] R Tyrrell Rockafellar, Stanislav Uryasev, et al. “Optimization of conditional value-at-risk”. In: *Journal of risk* 2 (2000), pp. 21–42.
- [90] Cynthia Rudin. “The P-Norm Push: A Simple Convex Ranking Algorithm That Concentrates at the Top of the List”. In: *J. Mach. Learn. Res.* 10 (Dec. 2009), pp. 2233–2271. ISSN: 1532-4435.
- [91] Olga Russakovsky et al. “Imagenet large scale visual recognition challenge”. In: *International journal of computer vision (IJCV)* 115.3 (2015), pp. 211–252. doi: [10.1007/s11263-015-0816-y](https://doi.org/10.1007/s11263-015-0816-y).
- [92] Karen Scarfone, Peter Mell, et al. “Guide to intrusion detection and prevention systems (idps)”. In: *NIST special publication* 800.2007 (2007), p. 94.
- [93] Mark Schmidt, Nicolas Le Roux, and Francis Bach. “Minimizing finite sums with the stochastic average gradient”. In: *Mathematical Programming* 162.1-2 (2017), pp. 83–112.
- [94] Bernhard Scholkopf and Alexander J Smola. *Learning with kernels: support vector machines, regularization, optimization, and beyond*. MIT press, 2001.
- [95] Shashank Shanbhag and Tilman Wolf. “Accurate anomaly detection through parallelism”. In: *IEEE network* 23.1 (2009), pp. 22–28.
- [96] Shai Shnlev-Shwartz and Tong Zhang. “Accelerated proximal stochastic dual coordinate ascent for regularized loss minimization”. In: *31st International Conference on Machine Learning, ICML 2014*. Vol. 1. 2014, p. 111.
- [97] Vincent G Sigillito et al. “Classification of radar returns from the ionosphere using neural networks”. In: *Johns Hopkins APL Technical Digest* 10.3 (1989), pp. 262–266.
- [98] Joshua Silman. “Steganography and steganalysis: an overview”. In: *Sans Institute* 3 (2001), pp. 61–76.
- [99] Václav Šmídl et al. “Analysis of cost functions and setpoints for predictive speed control of PMSM drives”. In: *2016 18th European Conference on Power Electronics and Applications (EPE'16 ECCE Europe)*. IEEE. 2016, pp. 1–8.
- [100] Václav Šmídl et al. “Predictive current limiter for LQ based control of AC drives”. In: *2015 IEEE International Symposium on Predictive Control of Electrical Drives and Power Electronics (PRECEDE)*. IEEE. 2015, pp. 55–60.
- [101] The Independent JPEG Group’s JPEG software. *Libjpeg*. 2014. URL: <https://github.com/LuaDist/libjpeg>.
- [102] Vaibhav Swaminathan et al. “Autonomous Driving System with Road Sign Recognition using Convolutional Neural Networks”. In: *2019 International Conference on Computational Intelligence in Data Science (ICCIDS)*. 2019, pp. 1–4. doi: [10.1109/ICCIDS.2019.8862152](https://doi.org/10.1109/ICCIDS.2019.8862152).
- [103] Mingxing Tan and Quoc Le. “Efficientnet: Rethinking model scaling for convolutional neural networks”. In: *International Conference on Machine Learning*. PMLR. 2019, pp. 6105–6114.

- [104] Dirk Tasche. “A plug-in approach to maximising precision at the top and recall at the top”. In: *arXiv preprint arXiv:1804.03077* (2018).
- [105] Thibaut Thonet et al. “SmoothI: Smooth Rank Indicators for Differentiable IR Metrics”. In: *arXiv preprint arXiv:2105.00942* (2021).
- [106] Giuseppe Viale. “The current state of breast cancer classification”. In: *Annals of Oncology* 23 (2012), pp. 207–210.
- [107] Jie Wang, Peter Wonka, and Jieping Ye. “Scaling SVM and least absolute deviations via exact data reduction”. In: *International conference on machine learning*. 2014, pp. 523–531.
- [108] Tino Werner. “A review on ranking problems in statistical learning”. In: *arXiv preprint arXiv:1909.02998* (2019).
- [109] Han Xiao, Kashif Rasul, and Roland Vollgraf. “Fashion-mnist: a novel image dataset for benchmarking machine learning algorithms”. In: *arXiv preprint arXiv:1708.07747* (2017).
- [110] Yang You et al. “Large batch optimization for deep learning: Training bert in 76 minutes”. In: *arXiv preprint arXiv:1904.00962* (2019).
- [111] Ao Zhang et al. “ τ -FPL: Tolerance-Constrained Learning in Linear Time”. In: *arXiv preprint arXiv:1801.04701* (2018).
- [112] Xi-Zheng Zhang. “Building personalized recommendation system in e-commerce using association rule-based mining and classification”. In: *2007 International Conference on Machine Learning and Cybernetics*. Vol. 7. IEEE. 2007, pp. 4113–4118.