ALEXANDRU NICULESCU-MIZIL

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EXPERIENCE

Senior Researcher
NEC Laboratories America

📅 Oct. 2010 – Feb. 2024 📍 Princeton, NJ

- **Primary focus:** Leading forward-looking research initiatives in machine learning. Designing novel algorithms tailored to address complex challenges within business units.
- **Multi-Camera Multi-Object Tracking:** Led a team in developing the first real-time end-to-end model for multi-camera multi-object tracking. Achieved integration of the entire detection and tracking process into one coherent, data-driven framework.
- **Contextual combinatorial optimization:** Developed methodologies for integrating combinatorial optimization and deep learning for scenarios with uncertain or unknown optimization objectives.
- **Machine Reasoning:** Designed and implemented a distributed system that combines deep learning with first order logic and knowledge bases to solve complex image retrieval tasks.
- **Fraud Detection in Stock Trades:** Developed a system for detecting spoofing (fraudulent) transactions for a major stock exchange. Reduced the need for manual evaluation by 82%. Recognized with a business contribution award.
- **Smart Manufacturing:** Designed a deep learning image-based system for automatic identification of manufacturing defects. Recognized with a business contribution award.
- **Extreme classification:** Devised a novel technique for accelerating classification in large scale multi-label problems. Improved the classification speed by 100-800% while preserving accuracy.
- **Large scale proteomic analysis:** Developed techniques for analyzing large scale proteomic assays. Developed methods for identifying significant changes in the statistical dependency structure between proteins in healthy and cancer patients

Visiting Lecturer
Princeton University

📅 Aug. 2013 – Jan. 2014 📍 Princeton, NJ

- Taught Introduction to AI course (COS 402)

Herman Goldstine Postdoctoral Fellow
IBM T.J. Watson Research Center

📅 Sept. 2008 – Sept. 2010 📍 Yorktown Hights, NY

- **Spatio-temporal modeling:** Developed techniques for modeling spatio-temporal data with emphasis on climate analytics.
- **Linked document collection modeling:** Developed techniques for modeling the interplay between document topics, authors' social network and inter-document links in large scale linked documents collections.
- **Semiconductor Manufacture Monitoring:** Developed systems for monitoring and diagnosing semiconductor manufacturing. Identified cause of critical chip cracking issue. Recognized with IBM Change Leadership Award.
- **KDD Cup competition:** Lead an international team that developed the winning solution for the 2009 KDD Cup competition on customer relationship prediction for a telecom company.

EDUCATION

Ph.D. in Computer Science
Cornell University

📅 May 2008

Magna cum Laude B.S. in Computer Science and Mathematics
University of Bucharest

📅 June 2000

AWARDS

🏅 **Business Contribution Award**
Fraud Detection in Stock Trade

🏅 **Business Contribution Award**
AI System for Quality Control of Manufactured Parts

🏅 **IBM Change Leadership Award**
Backside Damage Chip Cracking

🏆 **First Place KDDCup '09**
Leader of IBM Research team

🎓 **IBM Herman Goldstine Postdoctoral Fellowship**

🏅 **Best student paper COLT '08**
Regret Bounds for Sleeping Experts and Bandits

🏅 **Distinguished student paper ICML '05**
Predicting Good Probabilities with Supervised Learning

SKILLS

Machine Learning | Data Science
Deep Learning | Algorithm Design
Contextual Optimization | Computer Vision
NLP | Multi-Camera Multi-Object Tracking
Bioinformatics | Time Series Analysis
Transformers | GANs | Diffusion Models
Bayesian Networks/Graphical Models
Ensemble Methods/Boosting/Bagging/RF
SVM | Decision Trees | Clustering

PyTorch | Python | Pandas | NumPy
Scikit-Learn | C/C++ | Java | Lua | R
Answer Set Programming | Event Calculus
OpenMP | SLURM | git

PUBLICATIONS 12000+ CITATIONS, H-INDEX 24

📘 Edited Books

- I. Rish, G. A. Cecchi, A. Lozano, and A. Niculescu-Mizil, *Practical Applications of Sparse Modeling*. The MIT Press, 2014.

📘 Book Chapters

- C. Monteleoni, G. A. Schmidt, F. Alexander, *et al.*, "Climate informatics," in *Computational Intelligent Data Analysis for Sustainable Development*, 2013.

📄 Journal Articles

- Y. Liu, A. Niculescu-Mizil, A. Lozano, and Y. Lu, "Temporal graphical models for cross-species gene regulatory network discovery," *Journal of bioinformatics and computational biology*, vol. 9, 2011.

- R. D. Kleinberg, A. Niculescu-Mizil, and Y. Sharma, "Regret bounds for sleeping experts and bandits," *Machine Learning*, vol. 80, 2010.

- A. Niculescu-Mizil, C. Perlich, G. Swirszcz, *et al.*, "Winning the kdd cup orange challenge with ensemble selection," *Proceedings of Machine Learning Research, W&CP*, vol. 7, 2009.

- T. Fawcett and A. Niculescu-Mizil, "PAV and the ROC convex hull," *Machine Learning*, vol. 68, 2007.

👥 Conference Proceedings

- A. Niculescu-Mizil, D. A. Patel, and I. Melvin, "MCTR: Multi-camera tracking transformer," in *submission at Neural Information Processing Systems (NeurIPS)*, 2024.

- H. Zhou, A. Kadav, F. Lai, *et al.*, "Hopper: Multi-hop transformer for spatiotemporal reasoning," in *International Conference on Learning Representation (ICLR)*, 2021.

- A. Niculescu-Mizil and E. Abbasnejad, "Label filters for large scale multilabel classification," in *Artificial intelligence and statistics (AISTATS)*, 2017.

- A. Prasad, A. Niculescu-Mizil, and P. K. Ravikumar, "On separability of loss functions, and revisiting discriminative vs generative models," in *Advances in Neural Information Processing Systems (NeurIPS)*, 2017.

- A. Angelova and A. Niculescu-Mizil, "Feature combination with multi-kernel learning for fine-grained visual classification," in *IEEE Winter Conference on Applications of Computer Vision (WACV)*, 2014.

- C. Paxton, A. Niculescu-Mizil, and S. Saria, "Developing predictive models using electronic medical records: Challenges and pitfalls," in *Proceedings of American Medical Informatics Association Symposium (AMIA)*, 2013.

- S. Gopal, Y. Yang, B. Bai, and A. Niculescu-Mizil, "Bayesian models for large-scale hierarchical classification," in *Advances in Neural Information Processing Systems (NeurIPS)*, 2012.

- A. Kumar, A. Niculescu-Mizil, K. Kavukcoglu, and H. Daumé, "A binary classification framework for two-stage multiple kernel learning," in *Proceedings of the 29th International Coference on International Conference on Machine Learning (ICML)*, 2012.

PROFESSIONAL SERVICE

Action Editor: Transactions on Pattern Analysis and Machine Intelligence

Editorial Board: Machine Learning Journal

Senior Area Chair: AAAI '18-'23, ICLR '24

Area Chair: AAAI '16-'17, IJCAI'18-'19, NeurIPS '18-'22, ICML '16-'24

Grant Reviewing: NSF '13,'14,'20

Publications co-chair: KDD '11, KDD '12

KDD Cup co-chair: KDD '10

PATENT AWARDS

US PAT. NO. 11741712: Multi-hop transformer for spatio-temporal reasoning and localization

US PAT. NO. 11763198: Sensor contribution ranking

US PAT. NO. 11494377: Multi-detector probabilistic reasoning for natural language queries

US PAT. NO. 10162879: Label filters for large scale multi-label classification

US PAT. NO. 10964011: Anomaly detection with predictive normalization

US PAT. NO. 11120127: Reconstruction-based anomaly detection

US PAT. NO. 10593033: Reconstructor and contrastor for medical anomaly detection

US PAT. NO. 10733722: Reconstructor and contrastor for anomaly detection

US PAT. NO. 11087452: False alarm reduction system for automatic manufacturing quality control

US PAT. NO. 10853937: Unsupervised image-based anomaly detection using multi-scale context-dependent deep autoencoding gaussian mixture model

US PAT. NO. 9449284: Methods and systems for dependency network analysis using a multitask learning graphical lasso objective function

US PAT. NO. 8838508: Two-stage multiple kernel learning method

- Y. Liu, A. Niculescu-Mizil, A. C. Lozano, and Y. Lu, "Learning temporal causal graphs for relational time-series analysis," in *Proceedings of the 27th International Conference on Machine Learning (ICML)*, 2010.

- Y. Liu, A. Niculescu-Mizil, and W. Gryc, "Topic-link lda: Joint models of topic and author community," in *Proceedings of the 26th Annual International Conference on Machine Learning (ICML)*, 2009.

- A. C. Lozano, H. Li, A. Niculescu-Mizil, *et al.*, "Spatial-temporal causal modeling for climate change attribution," in *Proceedings of the 15th ACM SIGKDD international conference on Knowledge discovery and data mining (KDD)*, 2009.

- A. Niculescu-Mizil, "Multi-armed bandits with betting," in *On-line Learning with Limited Feedback*, 2009.

- R. D. Kleinberg, A. Niculescu-Mizil, and Y. Sharma, "Regret bounds for sleeping experts and bandits," in *21st Annual Conference on Learning Theory (COLT)*, 2008.

- A. Niculescu-Mizil and R. Caruana, "Inductive transfer for bayesian network structure learning," in *Proceedings of the 11th International Conference on AI and Statistics (AISTATS)*, 2007.

- M. Schmidt, A. Niculescu-Mizil, and K. Murphy, "Learning graphical model structure using l1-regularization paths," in *Proceedings of the 22nd Conference on Artificial Intelligence (AAAI)*, 2007.

- D. B. Skalak, A. Niculescu-Mizil, and R. Caruana, "Classifier loss under metric uncertainty," in *Proceedings of the 18th European Conference on Machine Learning (ECML)*, 2007.

- C. Bucilă, R. Caruana, and A. Niculescu-Mizil, "Model compression," in *Proceedings of the 12th International Conference on Knowledge Discovery and Data Mining (KDD)*, 2006.

- R. Caruana, A. Munson, and A. Niculescu-Mizil, "Getting the most out of ensemble selection," in *Proceedings of the 6th International Conference on Data Mining (ICDM)*, 2006.

- R. Caruana and A. Niculescu-Mizil, "An empirical comparison of supervised learning algorithms," in *Proceedings of the 23rd International Conference on Machine Learning (ICML)*, 2006.

- A. Niculescu-Mizil and R. Caruana, "Obtaining calibrated probabilities from boosting," in *Proceedings of the 21st Conference on Uncertainty in Artificial Intelligence (UAI '05)*, AUAI Press, 2005.

- A. Niculescu-Mizil and R. Caruana, "Predicting good probabilities with supervised learning," in *Proceedings of the 22nd International Conference on Machine Learning (ICML)*, 2005.

- R. Caruana and A. Niculescu-Mizil, "An empirical evaluation of supervised learning for roc area," in *First Workshop of ROC Analysis in AI (ROCAI)*, 2004.

- R. Caruana and A. Niculescu-Mizil, "Data mining in metric space: An empirical analysis of suppervised learning performance criteria," in *Proceedings of the Tenth International Conference on Knowledge Discovery and Data Mining (KDD)*, 2004.

- R. Caruana and A. Niculescu-Mizil, "Ensemble selection from libraries of models," in *Proceedings of the 21st International Conference on Machine Learning (ICML)*, 2004.