Zahra Atashgahi

Ph.D. in Machine Learning

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Work Experience

April 2024 – October 2019 | **Ph.D. Candidate in Machine Learning**
(May. 2020 - Apr. 2024) University of Twente, Enschede, The Netherlands
(Oct. 2019 - Apr. 2020) Eindhoven University of Technology, Eindhoven, The Netherlands

- **Project.** As a part of my PhD, I collaborate within the EDIC (Exceptional and Deep Intelligent Coach) project; we aim to develop an intelligent coach to support users in maintaining a healthy lifestyle. In this project, I mainly focus on feature Selection from high-dimensional data, event detection from multi-dimensional time series, and learning from heterogeneous data of diabetes patients.

Python | PyTorch | Tensorflow | Keras | R

September 2023 – July 2023 | **Machine Learning Scientist Intern**
Booking.com, Amsterdam, The Netherlands

- **Project :** Personalized Marketing : Exploring the Integration of Behavioral User Features to Enhance Decision-Making in Marketing.

Python | PySpark | PyTorch

April 2023 – January 2023 | **Research Visitor**
Department of Applied Mathematics and Theoretical Physics, University of Cambridge, van der Schaar Lab, Cambridge, United Kingdom

- **Topic :** Study of sparse neural networks for tabular data
- **Supervisor :** Prof. Dr. Mihaela van der Schaar (University of Cambridge)

Python | PyTorch

Education

April 2024 – October 2019 | **Ph.D. in Machine Learning**
(May. 2020 - Apr. 2024) University of Twente, Enschede, The Netherlands
(Oct. 2019 - Apr. 2020) Eindhoven University of Technology, Eindhoven, The Netherlands

- **Thesis :** Advancing Efficiency in Neural Networks through Sparsity and Feature Selection
- **Supervisors :** Dr. Decebal Mocanu (University of Luxembourg, University of Twente, Eindhoven University of Technology), Prof. Dr. Raymond Veldhuis (University of Twente), and Prof. Dr. Mykola Pechenizkiy (Eindhoven University of Technology)

September 2019 – September 2017 | **M.Sc. in Computer Science (Artificial Intelligence)**
Amirkabir University of Technology, Tehran, Iran

- **Thesis :** Abnormal Activity Detection for the Elderly People Living in Smart Homes

August 2017 – September 2013 | **B.Sc. in Computer Engineering**
Amirkabir University of Technology, Tehran, Iran

- **Thesis :** Design and Implementation of an IoT-Based Health Monitoring System

Honors & Awards

2022-2024 Exceptional and Deep Intelligent Coach, Sponsored by Dutch Research Council : NWO Grants for Computing Time on the National Computer Facilities, 90,000.
2022 Accepted as a student volunteer | *IJCAI 2022*
2021 Accepted at the Oxford Machine Learning Summer School (acceptance rate : 15%) | *OxML2021*
2021 Accepted as a student volunteer | *IJCAI 2021*
2021 Scholarship recipient for the 8th ACM Celebration of Women in Computing | *womENcourage 2021*
2012 Ranked **3rd** out of 45 in Artificial Intelligence Students | *Amirkabir University of Technology*
2017 Direct admission to Graduate Program (M.Sc.) in Artificial Intelligence | *Amirkabir University of Technology*
2017 Ranked **4th** out of 25 in Computer Hardware Engineering Students | *Amirkabir University of Technology*
2013 Ranked in top 0.8% in the National Entrance Exam among approximately $230k$ students | *Iran*
2011 Semi-finalist at Student National Mathematics Olympiad among high school Iranian students | *Iran*
2011 Semi-finalist at Student National Computer Olympiad among high school Iranian students | *Iran*

Organization

IJCAI 2023 (Tutorial) *Sparse Training for Supervised, Unsupervised, Continual, and Deep Reinforcement Learning with Deep Neural Networks*, IJCAI 2023, Macao. [Website]. **Organizers :** Elena Mocanu (*University of Twente*), Zahra Atashgahi (*University of Twente*), Ghada Sokar (*Eindhoven University of Technology*), Boqian Wu (*University of Twente*), Qiao Xiao (*Eindhoven University of Technology*), Bram Grooten (*Eindhoven University of Technology*), Shiwei Liu (*University of Texas*), Decebal C. Mocanu (*University of Twente*).

ICLR 2023 (Workshop) *Sparsity in Neural Networks On practical limitations and tradeoffs between sustainability and efficiency*, ICLR 2023, Kigali, Rwanda. [Website]. **Organizers :** Baharan Mirzasoleiman (*University of California*), Atlas Wang (*University of Texas*), Elena Mocanu (*University of Twente*), Decebal C. Mocanu (*University of Twente*), Ghada Sokar (*Eindhoven University of Technology*), Trevor Gale (*Google DeepMind*), Aleksandra Nowak (*Jagiellonian University*), Zahra Atashgahi (*University of Twente*), Utku Evci (*Google DeepMind*).

ECML-PKDD 2022 (Tutorial) *Sparse Neural Networks Training*, ECML-PKDD 2022, Grenoble, France. [Website]. **Organizers :** Shiwei Liu (*Eindhoven University of Technology*), Ghada Sokar (*Eindhoven University of Technology*), Zahra Atashgahi (*University of Twente*), Decebal C. Mocanu (*University of Twente*), Elena Mocanu (*University of Twente*)

Presentations

Invited Talk *Learning Efficiently from Data using Sparse Neural Networks* [link], TrustML Young Scientist Seminars organized by RIKEN-AIP center, Japan, Virtual.

Poster & oral presentation *Quick and robust feature selection : The strength of energy-efficient sparse training for autoencoders*, ECML-PKDD 2022, Grenoble, France

Poster & oral presentation *A brain-inspired algorithm for training highly sparse neural networks*, ECML-PKDD 2022, Grenoble, France

Oral presentation *A Brain-inspired Algorithm for Training Highly Sparse Neural Networks*, ICLR 2022 local, Eindhoven University of Technology (TU/e), Eindhoven, The Netherlands.

Poster *Feature selection with neuron evolution in sparse neural networks*, ICLR 2023 Workshop on Sparsity in Neural Networks : On practical limitations and tradeoffs between sustainability and efficiency, Kigali, Rwanda, 2023.

Poster *A brain-inspired algorithm for training highly sparse neural networks*. Workshop on Sparsity in Neural Networks : Advancing Understanding and Practice, 2022.

Poster *Quick and robust feature selection : The strength of energy-efficient sparse training for autoencoders*. Workshop on Sparsity in Neural Networks : Advancing Understanding and Practice, 2021.

Activities

2024 **[Program committee member]** *ICML 2024*.

2023 **[Program committee member]** *NeurIPS 2023*, *ICML 2023*, *ICLR 2023 SNN workshop*.

2023 **[Organization]** Admin in *Sparse Neural Networks* reading group, *Google Sparsity Reading Group*.

2023 **[Organization]** Co-chairing panel session with Utku Evci (Researcher @Google DeepMind) (panelists : Jeff Dean (Google Senior Fellow and SVP for Google Research), Nir Shavit (Prof @MIT), Aakanksha Chowdhery (Staff Research Scientist Google DeepMind), Pavlo Molchanov (principal research scientist and research lead at NVIDIA))

2022 - 2023 **[Project management]** *EDIC* (Exceptional and Deep Intelligent Coach) Project.

2022 **[Summer school]** AI and Machine Learning in Healthcare, *Virtual*.

2022 **[Program committee member]** *NeurIPS 2022*, *ICML 2022*, AAAI 2023, *SNN 2022*.

2021 **[Summer school]** Oxford Machine Learning (OxML2021), *Virtual*.

2021 **[Program committee member]** *ICBINB @NeurIPS 2021*, *SNN 2021*, *CLEATED @ICDM 2021*.

2021 - 2022 **[Organization]** Co-organizing *Sparse Neural Networks* discussion group, *University of Twente*.

2020 - 2022 **[Organization]** Organizing study group on *Mathematics for Machine Learning* book, *University of Twente*.

Teaching & Supervision

Supervision Together with Dr. Decebal Mocanu

- **M.Sc. Student Supervision [Eindhoven University of Technology | Dec. 2022 – Oct. 2023]**
  - Kaiting Liu, *Supervised Feature Selection via Ensemble Gradient Information from Sparse Neural Networks* (**Cum Laude**)
  - Matthijs Keep, *Supervised feature selection*
- **B.Sc. Student Supervision [University of Twente | Apr. 2021 – Jul. 2021]**
  - Neil Kichler, *Robustness of sparse MLPs for supervised feature selection* (**Best thesis award**)
  - Xuhao Zhang, *Supervised feature selection using sparse neural networks*
  - Karolis Girdziunas, *Supervised Feature Selection using Sparse Training and Neuron Strength*

Teaching Amirkabir University of Technology, Tehran, Iran.

- Teaching Assistant : Internet Engineering (Fall 2017)
- Teaching Assistant : Computer Networks (Spring 2017)
- Teaching Assistant : Electrical Circuits (Spring 2017)

Technical Skills

Programming Languages	Python, R, Matlab, C/C++, Java
Machine Learning Libraries	PyTorch, Tensorflow, Keras, Scikit-Learn, Pandas, NumPy
Database Systems	PySpark, MySQL, SQL Server
Hardware Design Languages	Verilog, VHDL, 8086 Assembly, AVR Assembly
Web Development	HTML5, CSS, XML, XSLT, JavaScript, Jqueri, AJAX, PHP

Languages

English (*Working proficiency*), **Persian** (*Native*), **Dutch** (*Elementary*), **Arabic** (*Elementary*)

Publications

Journal Publications

1. **Zahra Atashgahi**, Xuhao Zhang, Neil Kichler, Shiwei Liu, Lu Yin, Mykola Pechenizkiy, Raymond Veldhuis, and Decebal Constantin Mocanu. *Supervised feature selection with neuron evolution in sparse neural networks*. Transactions on Machine Learning Research (TMLR), 2023. [paper] [code]
2. **Zahra Atashgahi**, Ghada Sokar, Tim van der Lee, Elena Mocanu, Decebal Constantin Mocanu, Raymond Veldhuis, and Mykola Pechenizkiy. *Quick and robust feature selection : the strength of energy-efficient sparse training for autoencoders*. Machine Learning 111, ECML-PKDD journal track, 377–414, 2022. [paper] [code]
3. **Zahra Atashgahi**, Joost Pieterse, Shiwei Liu, Decebal Constantin Mocanu, Raymond Veldhuis, and Mykola Pechenizkiy. *A brain-inspired algorithm for training highly sparse neural networks.* Machine Learning 111, ECML-PKDD journal track, 4411-4452, 2022. [paper] [code]

Conference Publications

4. **Zahra Atashgahi**, Mykola Pechenizkiy, Raymond Veldhuis, and Decebal Constantin Mocanu. *Adaptive Sparsity Level during Training for Efficient Time Series Forecasting with Transformers*. ECML-PKDD 2024, 2023. [paper]
5. Kaiting Liu, **Zahra Atashgahi**, Ghada Sokar, Mykola Pechenizkiy, Decebal Constantin Mocanu. *Supervised Feature Selection via Ensemble Gradient Information from Sparse Neural Networks*. Artificial Intelligence and Statistics (AISTATS 2024), 2024.
6. **Zahra Atashgahi**, *Cost-effective Artificial Neural Networks*, International Joint Conferences on Artificial Intelligence Organization (IJCAI), Doctoral Consortium, 2023. [paper]
7. Ghada Sokar, **Zahra Atashgahi**, Mykola Pechenizkiy, and Decebal Constantin Mocanu. *Where to pay attention in sparse training for feature selection?*. Advances in Neural Information Processing Systems (NeurIPS), 2023. [paper] [code]
8. Shiwei Liu, Tianlong Chen, **Zahra Atashgahi**, Xiaohan Chen, Ghada Sokar, Elena Mocanu, Mykola Pechenizkiy, Zhangyang Wang, and Decebal Constantin Mocanu. *Deep ensembling with no overhead for either training or testing : The all-round blessings of dynamic sparsity*. International Conference on Learning Representations (ICLR), 2022. [paper] [code]
9. Shiwei Liu, Tianlong Chen, Xiaohan Chen, **Zahra Atashgahi**, Lu Yin, Huanyu Kou, Li Shen, Mykola Pechenizkiy, Zhangyang Wang, and Decebal Constantin Mocanu. *Sparse Training via Boosting Pruning Plasticity with Neuroregeneration*. Advances in Neural Information Processing Systems (NeurIPS), 2021. [paper] [code]
10. **Zahra Atashgahi**, Decebal Constantin Mocanu, Raymond Veldhuis, and Mykola Pechenizkiy. *Unsupervised online memory-free change-point detection using an ensemble of LSTM-autoencoder-based neural networks*. In 8th ACM Celebration of Women in Computing womENcourage, 2021. [paper]
11. **Zahra Atashgahi**, Ghada Sokar, Tim van der Lee, Elena Mocanu, Decebal Constantin Mocanu, Ramond Veldhuis, and Mykola Pechenizkiy. *Quick and Robust Feature Selection : the Strength of Energy-efficient Sparse Training for Autoencoders (Extended Abstract)*. Joint International Scientific Conferences on AI BNAIC/BENELEARN, 2021. [paper]
12. Shiwei Liu, Tim Van der Lee, Anil Yaman, **Zahra Atashgahi**, Davide Ferraro, Ghada Sokar, Mykola Pechenizkiy, and Decebal Constantin Mocanu. *Topological insights into sparse neural networks.* The European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases, (ECML-PKDD), Ghent, Belgium, 2020. [paper] [code]

Preprints (under review)

11. **Zahra Atashgahi**, Tennison Liu, Mykola Pechenizkiy, Raymond Veldhuis, Decebal Constantin Mocanu, Mihaela van der Schaar. *Unveiling the Power of Sparse Neural Networks for Feature Selection*. (under review at ECAI 2024), 2024.

12. **Zahra Atashgahi**, Decebal Constantin Mocanu, Raymond Veldhuis, and Mykola Pechenizkiy. *Memory-free online change-point detection : A novel neural network approach*. arXiv preprint arXiv :2207.03932 (Under review at Neural Computing and Applications journal), 2022. [paper] [code]