Zahra Atashgahi

Ph.D. Candidate in Machine Learning

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Work Experience

April 2024 (Expected) – May 2020
Ph.D. Candidate in Machine Learning
University of Twente, Enschede, The Netherlands
- **Topic :** Advancing Efficiency in Neural Networks through Sparsity and Feature Selection
- **Supervisors :** Dr. Decebal Mocanu (University of Luxembourg/ Eindhoven University of Technology), Prof. Dr. Raymond Veldhuis (University of Twente), and Prof. Dr. Mykola Pechenizkiy (Eindhoven University of Technology)

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

Present – October 2019
Ph.D. Candidate in Machine Learning
(May. 2020 - Present) 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/ 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
University of Twente, Enschede, The Netherlands
- **Thesis :** Design and Implementation of an IoT-Based Health Monitoring System

Honors

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*

Technical Skills

Programming Languages	**Python**, Matlab, R, 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

Organization

IJCAI 2023 (Tutorial)	Sparse Training for Supervised, Unsupervised, Continual, and Deep Reinforcement Learning with Deep Neural Networks, IJCAI 2023, *Macao*. [Website]
ICLR 2023 (Workshop)	Sparsity in Neural Networks On practical limitations and tradeoffs between sustainability and efficiency, ICLR 2023, *(Kigali, Rwanda)* [Website]
ECML-PKDD 2022 (Tutorial)	Sparse Neural Networks Training, ECML-PKDD 2022, *(Grenoble, France)* [Website]

Presentations

Talk	*Learning Efficiently from Data using Sparse Neural Networks* [link 🔗], TrustML Young Scientist Seminars organized by RIKEN-AIP center, 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*, 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*. Sparsity in Neural Networks : Advancing Understanding and Practice, 2022.
Poster	*Quick and robust feature selection : The strength of energy-efficient sparse training for autoencoders*. Sparsity in Neural Networks : Advancing Understanding and Practice, 2021.

Activities

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

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**, *Cost-effective Artificial Neural Networks*, International Joint Conferences on Artificial Intelligence Organization (IJCAI), Doctoral Consortium, 2023. [paper]

5. 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]

6. 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]

7. 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]

8. **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]

9. **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]

10. 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**, Mykola Pechenizkiy, Raymond Veldhuis, and Decebal Constantin Mocanu. *Adaptive Sparsity Level during Training for Efficient Time Series Forecasting with Transformers*. arXiv preprint arXiv :2305.18382 (under review at AISTATS 2024), 2023. [paper]

12. Kaiting Liu, **Zahra Atashgahi**, Ghada Sokar, Mykola Pechenizkiy, Decebal Constantin Mocanu. *Supervised Feature Selection via Ensemble Gradient Information from Sparse Neural Networks*. (under review at AISTATS 2024), 2023.

13. **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]