# Zahra Atashgahi

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## RESEARCH INTERESTS

- Machine Learning   • Sparse Neural Networks   • Deep Learning   • Cost-efficient Neural Networks
- Time Series Analysis   • Healthcare   • Interpretability   • Feature Selection   • Continual Learning

## EDUCATION

**Ph.D. in Artificial Intelligence**, University of Twente                           Oct. 2019 – Apr. 2024 (Expected)
- Faculty of Electrical Engineering, Mathematics and Computer Science, Data Management & Biometrics Group

**M.Sc. in Computer Science (Artificial Intelligence)**, Amirkabir University of Technology          Sep. 2017 – Sep. 2019
- **Thesis:** Abnormal Activity Detection for the Elderly People Living in Smart Homes

**B.Sc. in Computer Engineering**, Amirkabir University of Technology (Tehran Polytechnic)          Sep. 2013 – Aug. 2017
- **Thesis:** Design and Implementing IoT-Based Health Monitoring System

## WORK EXPERIENCE

**Machine Learning Scientist Intern at *Booking.com***                                Jul. 2023 – Sep. 2023
    Amsterdam (on-site)
- **Project.** Enhancing Predictive Performance in Marketing: Exploring the Integration of Behavioral User Feature

**PhD Candidate in Artificial Intelligence**                                Oct. 2019 – Apr. 2024 (Expected)
    University of Twente, The Netherlands (May. 2020 – Present)
    Eindhoven University of Technology, The Netherlands (Oct. 2019 – Apr. 2020)
- **Topic:** Cost-effective artificial neural networks. In my Ph.D. research, I seek to develop algorithms for artificial neural networks to solve various machine learning tasks efficiently while considering the optimal trade-off between computational costs, data requirements, and performance.
- **Supervisors:** Dr. Decebal Mocanu (University of Twente/ Eindhoven University of Technology), Prof. Dr. Raymond Veldhuis (University of Twente), and Prof. Dr. Mykola Pechenizkiy (Eindhoven University of Technology).
- **Project.** As a part of my PhD, I collaborate in 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

**Student Visitor**, University of Cambridge                                Jan. 2023 – Apr. 2023
    Department of Applied Mathematics and Theoretical Physics, van der Schaar Lab
- **Supervisor:** Prof. Dr. Mihaela van der Schaar (University of Cambridge)

## HONORS & AWARDS

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|---|---:|
| Accepted as a student volunteer \| *IJCAI 2022* | 2022 |
| 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* | 2021 |
| Ranked **3rd** out of 45 in Artificial Intelligence Students \| *Amirkabir University of Technology* | 2019 |
| 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* | 2017 |
| Ranked in top 0.8% in the National Entrance Exam among approximately 230$k$ students \| *Iran* | 2012 |
| 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* | 2011 |

## TECHNICAL SKILLS

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

## ACTIVITIES

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|---|---:|
| Program committee member at *NeurIPS 2023*, *ICML 2023*, *ICLR 2023 SNN workshop* | 2023 |
| Project Management within *EDIC* (Exceptional and Deep Intelligent Coach) Project | Apr. 2022 – Apr. 2023 |
| Program committee member at *NeurIPS 2022*, *ICML 2022*, AAAI 2023, *SNN 2022* | 2022 |
| Program committee member at *ICBINB @NeurIPS 2021*, *SNN 2021*, *CLEATED @ICDM 2021* | 2021 |
| Co-organizing *Sparse Neural Networks* discussion group \| *University of Twente* | Dec. 2020 – June 2022 |
| Organizing study group on *Mathematics for Machine Learning* book \| *University of Twente* | Nov. 2020 – June 2022 |
| Neural Networks and Deep Learning \| *Coursera* | Aug. 2018 |

## Personal and professional development

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|---|---|
| AI and Machine Learning in Healthcare Summer School | *Virtual* | Sep. 2022 |
| Science writing | *University of Twente* | Nov. 2021 |
| Oxford Machine Learning Summer School (OxML2021) | *Virtual* | Aug. 2021 |
| Academic presentations bootcamp | *University of Twente* | Aug. 2021 |
| Scientific information bootcamp | *University of Twente* | Apr. 2021 |
| Academic publishing bootcamp | *University of Twente* | Feb. 2021 |
| Neural Networks and Deep Learning | *Coursera* | Aug. 2018 |

## Organization

1. (Tutorial) Sparse Training for Supervised, Unsupervised, Continual, and Deep Reinforcement Learning with Deep Neural Networks, **IJCAI 2023**, *Macao.* [Website]

2. (Workshop) Sparsity in Neural Networks On practical limitations and tradeoffs between sustainability and efficiency, **ICLR 2023**, *(Kigali, Rwanda)* [Website]

3. (Tutorial) Sparse Neural Networks Training, **ECML-PKDD 2022**, *(Grenoble, France)* [Website]

## Teaching & Supervision

M.Sc. Student Supervision (Together with Dr. Decebal Mocanu) | *Eindhoven University of Technology* Dec. 2022 – Oct. 2023
- Matthijs Keep, "Supervised feature selection"
- Kaiting Liu, "Supervised sparse training"  (*Cum Laude*)

B.Sc. Student Supervision (Together with Dr. Decebal Mocanu) | *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 Evolutionary Training and Neuron Strength"

Teaching Assistant | *Amirkabir University of Technology*    2017
- Internet Engineering  (Fall 2017)
- Computer Networks  (Spring 2017)
- Electrical Circuits  (Spring 2017)

## Language Skills

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

## Publications

1. **Atashgahi**, **Z.** (2023). Cost-effective artificial neural networks [Doctoral Consortium]. *Proceedings of the Thirty-Second International Joint Conference on Artificial Intelligence, IJCAI-23.*

2. **Atashgahi**, **Z.**, Zhang, X., Kichler, N., Liu, S., Yin, L., Pechenizkiy, M., Veldhuis, R., & Mocanu, D. C. (2022). Feature selection with neuron evolution in sparse neural networks. *Transactions on Machine Learning Research (TMLR).*

3. Sokar, G., **Atashgahi**, **Z.**, Pechenizkiy, M., & Mocanu, D. C. (2022). Where to pay attention in sparse training for feature selection? *Advances in Neural Information Processing Systems (NeurIPS 2022).*

4. **Atashgahi**, **Z.**, Pieterse, J., Liu, S., Mocanu, D. C., Veldhuis, R., & Pechenizkiy, M. (2022a). A brain-inspired algorithm for training highly sparse neural networks. *Accepted at Machine Learning (ECML-PKDD journal track), arXiv preprint arXiv:1903.07138.* [code]

5. **Atashgahi**, **Z.**, Sokar, G., van der Lee, T., Mocanu, E., Mocanu, D. C., Veldhuis, R., & Pechenizkiy, M. (2022). Quick and robust feature selection: The strength of energy-efficient sparse training for autoencoders. *Machine Learning (ECML-PKDD Journal track)*, 111(1), 377–414. [code]

6. Liu, S., Chen, T., **Atashgahi**, **Z.**, Chen, X., Sokar, G., Mocanu, E., Pechenizkiy, M., Wang, Z., & Mocanu, D. C. (2022). Deep ensembling with no overhead for either training or testing: The all-round blessings of dynamic sparsity. *International Conference on Learning Representations (ICLR 2022).* [code]

7. Liu, S., Chen, T., Chen, X., **Atashgahi**, **Z.**, Yin, L., Kou, H., Shen, L., Pechenizkiy, M., Wang, Z., & Mocanu, D. C. (2021). Sparse training via boosting pruning plasticity with neuroregeneration. *Advances in Neural Information Processing Systems (NeurIPS 2021).* [code]

8. **Atashgahi**, **Z.**, Mocanu, D. C., Veldhuis, R., & Pechenizkiy, M. (2021). Unsupervised online memory-free change-point detection using an ensemble of lstm-autoencoder-based neural networks (extended abstract). *8th ACM Celebration of Women in Computing womENcourage.*

9. **Atashgahi**, **Z.**, Sokar, G., van der Lee, T., Mocanu, E., Mocanu, D. C., Veldhuis, R., & Pechenizkiy, M. (2021a). Quick and robust feature selection: The strength of energy-efficient sparse training for autoencoders [extended abstract]. *Proceedings of BNAIC/BENELEARN 2021.*

10. Liu, S., van der Lee, T., Yaman, A., **Atashgahi**, **Z.**, Ferraro, D., Sokar, G., Pechenizkiy, M., & Mocanu, D. C. (2020). Topological insights into sparse neural networks. *Proceedings of ECML-PKDD.* [code]

## PREPRINTS

1. (Under review) **Atashgahi**, **Z.**, Veldhuis, R., Pechenizkiy, M., & Mocanu, D. C. (2023). Adaptive sparsity level during training for efficient time series forecasting with transformers. *arXiv preprint arXiv:2305.18382*

2. (Under review) **Atashgahi**, **Z.**, Mocanu, D. C., Veldhuis, R., & Pechenizkiy, M. (2022). Memory-free online change-point detection: A novel neural network approach. *arXiv preprint arXiv:2207.03932* [code]

## POSTERS AND PRESENTATIONS

1. (talk) "Learning Efficiently from Data using Sparse Neural Networks" [link], TrustML Young Scientist Seminars organized by RIKEN-AIP center, Virtual.

2. (poster) **Atashgahi**, **Z.**, Zhang, X., Kichler, N., Liu, S., Yin, L., Pechenizkiy, M., Veldhuis, R., & Mocanu, D. C. (2023). 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

3. (poster and oral presentation), "Quick and robust feature selection: The strength of energy-efficient sparse training for autoencoders", ECML-PKDD 2022, Grenoble, France.

4. (poster and oral presentation) "A brain-inspired algorithm for training highly sparse neural networks", ECML-PKDD 2022, Grenoble, France.

5. (oral presentation) "A Brain-inspired Algorithm for Training Highly Sparse Neural Networks", Eindhoven University of Technology (TU/e), Eindhoven, The Netherlands.

6. (poster) **Atashgahi**, **Z.**, Pieterse, J., Liu, S., Mocanu, D. C., Veldhuis, R., & Pechenizkiy, M. (2022b). A brain-inspired algorithm for training highly sparse neural networks [Sparsity in Neural Networks: Advancing Understanding and Practice 2022, SNN Workshop 2022] [Link]

7. (poster) **Atashgahi**, **Z.** (2021). Cost-effective artificial neural networks [IJCAI 2021 (virtual), doctoral consortium workshop]

8. (poster) **Atashgahi**, **Z.**, Sokar, G., van der Lee, T., Mocanu, E., Mocanu, D., Veldhuis, R., & Pechenizkiy, M. (2021b). Quick and robust feature selection: The strength of energy-efficient sparse training for autoencoders [Sparsity in Neural Networks: Advancing Understanding and Practice 2021, SNN Workshop 2021]

9. (poster) Kichler, N., **Atashgahi**, **Z.**, & Mocanu, D. (2021). Robustness of sparse mlps for supervised feature selection [Sparsity in Neural Networks: Advancing Understanding and Practice 2021, SNN Workshop 2021]

10. (poster) Liu, S., Chen, T., **Atashgahi**, **Z.**, Chen, X., Sokar, G., Mocanu, E., Pechenizkiy, M., Wang, Z., & Mocanu, D. (2021). Freetickets: Accurate, robust and efficient deep ensemble by training with dynamic sparsity [Sparsity in Neural Networks: Advancing Understanding and Practice 2021, SNN Workshop 2021]