# Sara Rajaee

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## Education

**UvA** · **University of Amsterdam** *Amsterdam, Netherlands : Oct. 2022 - present*

Ph.D. in Computer Science

- Advised by Prof. Christof Monz.
- My research revolves around multilinguality and low-resource language processing.

**IUST** · **Iran University of Science and Technology** *Tehran, Iran : Sep. 2019 - Mar. 2022*

M.Sc. in Computer Engineering

- Advised by Prof. Mohammad Taher Pilehvar.
- Thesis: Analyzing the Geometry of Embedding Space in Large Language Models.

**IUST** · **Iran University of Science and Technology** *Tehran, Iran : Sep. 2014 - Sep. 2019*

B.Sc. in Computer Engineering

- Advised by Prof. Vesal Hakami.
- Thesis: Optimizing Content Placement in Cache-enabled Small Base Stations: A Game Theoretic Multi-agent Learning Approach.

## Research Interests

- Natural Language Processing
- Mathematical Reasoning of Large Language Models
- Multilinguality and low-resource language processing

## Publications

- **Sara Rajaee***, Kumar Pratik*, Gabriele Cesa, Arash Behboodi "Local Look-Ahead Guidance via Verifier-in-the-Loop for Automated Theorem Proving", (**Reasoning and Planning for LLM, ICLR 2025**, Work has done during my internship at Qualcomm).
- Rochelle Choenni*, **Sara Rajaee***, Christof Monz, Ekaterina Shutova. "Holding a Lens to Evaluation Practices in Multilingual NLP: Can Machine Translation Offer a Scalable Alternative?", (**Under Review.**).
- **Sara Rajaee**, and Christof Monz. "Analyzing the Evaluation of Cross-Lingual Knowledge Transfer in Multilingual Language Models", (**EACL 2024**) [pdf].
- Mohammad A. Tajari*, **Sara Rajaee***, and Mohammad Taher Pilehvar. "An Empirical Study on the Transferability of Transformer Modules in Parameter-efficient Fine-tuning", Accepted in the 2022 Conference on Empirical Methods in Natural Language Processing (**EMNLP 2022**), [pdf].
- **Sara Rajaee**, Yadollah Yaghoobzadeh, and Mohammad Taher Pilehvar. "Looking at the Overlooked: An Analysis on the Word-Overlap Bias in Natural Language Inference", Accepted in the 2022 Conference on Empirical Methods in Natural Language Processing (**EMNLP 2022**), [pdf].
- **Sara Rajaee**, and Mohammad Taher Pilehvar. "An Isotropy Analysis in the Multilingual BERT Embedding Space." Accepted in the 60th Annual Meeting of the Association for Computational Linguistics (**Findings of ACL 2022**), [pdf].
- Houman Mehrafarin*, **Sara Rajaee***, and Mohammad Taher Pilehvar. "On the Importance of Data Size in Probing Fine-tuned Models." Accepted in the 60th Annual Meeting of the Association for Computational Linguistics (**Findings of ACL 2022**), [pdf].
- **Sara Rajaee**, and Mohammad Taher Pilehvar. "How Does Fine-tuning Affect the Geometry of Embedding Space: A Case Study on Isotropy." Accepted in the 2021 Conference on Empirical Methods in Natural Language Processing (**Findings of EMNLP 2021**), [pdf].
- **Sara Rajaee**, and Mohammad Taher Pilehvar. "A Cluster-based Approach for improving Isotropy in Contextual Embedding Space." Accepted in the 59th Annual Meeting of the Association for Computational Linguistics and the 11th International Joint Conference on Natural Language Processing (**ACL-IJCNLP 2021, Oral presentation**), [pdf].
- Zahra Rashidi, Vesal Hakami, Parmida Granmayeh, **Sara Rajaee**. "Multi-Agent Learning Algorithms for Content Placement in Cache-Enabled Small Cell Networks: 4G and 5G Use Cases." Accepted in Neural Computing and Applications, 2022, [pdf], (IF: 5.606).

## Research Experience

**Research Intern :** **Qualcomm AI Research** *Jul. - Nov. 2024*
- Working on mathematical reasoning of LLM.
- Working on the application of LLMs in theorem proving.

**Graduate Research Assistance :** **NLP Lab, IUST** *Feb 2020 - Sep 2022*
- Working on robustness of pre-trained Language Models (LLMs)
- Working on probing linguistic knowledge in LLMs
- Worked on Analyzing the geometry of contextual embedding space
- Supervised by Prof. Mohammad Taher Pilehvar

**Research Assistance :** **Institute for Research in Fundamental Sciences (IPM)** *Jun - Jul 2021*
- Worked on the adversarial attacks and robustness of LLMs
- Supervised by Prof. Mohammad Sabokrou

**Undergraduate Research Assistant :** **Computer Networks Lab, IUST** *Jul 2019 - Apr 2020*
- Formulated the content placement problem in cache-enabled small cell networks as a potential game.
- Implemented reinforcement learning algorithms for the incomplete information environment.
- Proposed a multi-agent approach for content placement.
- Supervised by Prof. Vesal Hakami

**Undergraduate Research Assistant :** **Information Technology Lab, IUST** *Oct 2015 - Feb 2017*
- Worked on Computational offloading in Mobile Cloud Computing
- Developed a benchmark including an Android application and a server-side service.
- Supervised by Prof. Zeinab Movahedi

## Teaching Experience

**Teaching Assistant :** **Neuromatch academy Deep Learning (NMA-DL) summer school** *Aug 2022*
- Mentored 9 groups on several Deep Reinforcement Learning and Natural Language Processing projects

**Head Teaching Assistant :** **IUST** *Sep 2021 - Feb. 2022*
- Natural Language Processing (Instructor: Dr. Minaei)
  - Gave a lecture on seq2seq models, transformers, and advanced topics in NLP.
- Neural Networks (Instructor: Dr. Mozayani)

**Teaching Assistant :** **Neuromatch academy Deep Learning (NMA-DL) summer school** *Aug 2021*
- Mentored 7 groups on several Deep Reinforcement Learning projects

**Graduate Teaching Assistant :** **IUST** *Feb - Jul 2021*
- Deep learning (Instructor: Dr. Mohammadi)
- Game theory (Instructor: Dr. Hakami)
- Advanced topics in data mining (Instructor: Dr. Minaei)

**Head Teaching Assistant :** **IUST** *Sep 2020 - Feb 2021*
- Neural Networks (Instructor: Dr. Mozayani)
- Natural Language Processing (Instructor: Dr. Minaei)
  - Gave a lecture on seq2seq models, transformers, and advanced topics in NLP.

## Skills and Languages

**Skills:**
- **Languages:** Python, C++
- **Frameworks:** TensorFlow, PyTorch
- **Libraries:** NumPy, SciPy, Pandas, Scikit-learn, Mathplotlib
- **Familiar with:** C#, SQL

**Languages:**
- Farsi, Native
- English, Fluent (TOEFL: 101)
- French, limited

## Professional Experience

**Reviewer**
- ACL Rolling Review. 2021-current.
- BlackBoxNLP 2021, 2022, 2023.
- EMNLP 2022,2023, 2024.
- ACL 2021, 2022.

**Invited Talks**
- A Cluster-based Approach for improving Isotropy in Contextual Embedding Space. At IPM, Jun. 2021.
- Isotropicity of Semantic Spaces. At TeIAS, Apr. 2021.

**Volunteer Services**
- Volunteer student at EMNLP 2021.