Mojtaba Nayyeri

Curriculum Vitae

Institute for Artificial Intelligence
University of Stuttgart, Stuttgart, Germany

✉ mojtaba.nayyeri@ki.uni-stuttgart.de   🌐 mojtaba.nayyeri   🎓 Google Scholar   in mojtaba-nayyeri   🐦 MojtabaNayyeri   ○ mojtabanayyeri

Research Interests

Graph Foundation Models, Generative AI, Language Models, Knowledge Graph Analysis, Agentic AI, Geometric Deep Learning, Semantic-guided Deep Learning

Education and Research Experience

University of Stuttgart   **Stuttgart, Germany**
Senior Researcher   *June 2023 –*
Advisors: Prof. Dr. Steffen Staab
Analytic Computing Group, Institute for AI
Research in Graph Foundation Models, Geometric Graph-based ML, Knowledge Graph Embedding, LLMs, Temporal KG Analysis

University of Stuttgart   **Stuttgart, Germany**
Ph.D., Computer Science   *June 2021 –*
Supervisor: Prof. Dr. Steffen Staab
Thesis: Pattern-aware Knowledge Graph Embeddings

University of Bonn   **Bonn, Germany**
Researcher, Smart Data Analytics   *Mar 2018 – Dec 2021*
Department of Computer Science
Research in Static and Temporal Knowledge Graph Learning

Ferdowsi University of Mashhad   **Mashhad, Iran**
Student Assistant, Pattern Recognition Lab   *Mar 2013 – Sept 2015*
Research and Development on Neural Networks

Ferdowsi University of Mashhad   **Mashhad, Iran**
M.Sc., Artificial Intelligence   *Sept 2012 – Sept 2014*
Thesis: Compact Incremental Learning Machine
Thesis Grade: 4.00/4.00
GPA: 3.68/4.00

Ferdowsi University of Mashhad   **Mashhad, Iran**
B.Sc., Computer Engineering   *Sept 2008 – Dec 2012*
Thesis Grade: 4.00/4.00

Scholarships and Awards

○ Iranian Ministry of Science Scholarship, 2018 – 2021

○ Awarded 1st place in the Artificial Intelligence group, 2014

○ Spotlight paper in ISWC conference – 2020

○ Oral paper at EMLP 2021 –Top 5-15% of submissions

○ Best student paper in ISWC conference – 2022

Publications

Conference

1. Pan, J., **Nayyeri, M.**, Mohammed, O., Hernandez, D., Zhang, R., Cheng, C., and Staab, S. (2025). Towards Foundation Model on Temporal Knowledge Graph Reasoning. arXiv preprint arXiv:2506.06367. (Submitted to NeurIPS 25)

2. Mohammed, O., Pan, J., **Nayyeri, M.**, Hernandez, and Staab, S. (2025). Full-History Graphs with Edge-Type Decoupled Networks for Temporal Reasoning. Accepted ECAI 25.

3. Azarafza, M., **Nayyeri, M.**, Pasandideh, F., Staab, S., and Rettberg, A. (2025). Mathematical Reasoning for Unmanned Aerial Vehicles: A RAG-Based Approach for Complex Arithmetic Reasoning. arXiv preprint arXiv:2506.04998 (submitted to EMNLP25).

4. **Nayyeri, M.**, Yogi, A. A., Fathallah, N., Thapa, R. B., Tautenhahn, H. M., Schnurpel, A., and Staab, S. (2025). Retrieval-Augmented Generation of Ontologies from Relational Databases. arXiv preprint arXiv:2506.01232. (Submitted to ISWC).

5. Arun, A., Kumar, S., **Nayyeri, M.**, Xiong, B., Kumaraguru, P., Vergari, A., and Staab, S. (2025). SEMMA: A Semantic-Aware Knowledge Graph Foundation Model. arXiv preprint arXiv:2505.20422. (Submitted to EMNLP25).

6. Xiong, B., **Nayyeri, M.**, Jin, M., He, Y., Cochez, M., Pan, S., and Staab, S. (2025). Geometric Relational Embeddings: Progress and Prospects. Handbook on Neurosymbolic AI and Knowledge Graphs, 213-229.

7. Azarafza, M., **Nayyeri, M.**, Steinmetz, C., Staab, S., and Rettberg, A. (2024, November). Hybrid reasoning based on large language models for autonomous car driving. In 2024 12th International Conference on Control, Mechatronics and Automation (ICCMA) (pp. 14-22). IEEE.

8. A.-M. Halacheva, **M. Nayyeri**, and S. Staab, Expanding expressivity in transformer models with Möbiusattention, *arXiv preprint arXiv:2409.12175*, 2024. (Submitted to NeurIPS 25).

9. Zhu, Y., Potyka, N., **Nayyeri, M.**, Xiong, B., He, Y., Kharlamov, E., and Staab, S. (2024, November). Predictive Multiplicity of Knowledge Graph Embeddings in Link Prediction. In Findings of the Association for Computational Linguistics: EMNLP 2024 (pp. 334-354).

10. Y. Zhu, N. Potyka, B. Xiong, T.-K. Tran, **M. Nayyeri**, E. Kharlamov, and S. Staab, Approximating probabilistic inference in statistical EL with knowledge graph embeddings, *arXiv preprint arXiv:2407.11821*, 2024.

11. He, Y., Hernández, D., **Nayyeri, M.**, Xiong, B., Zhu, Y., Kharlamov, E., and Staab, S. (2024, January). Generating SROIO ontologies via knowledge graph query embedding learning. In ECAI.

12. J. Pan, **M. Nayyeri**, L. Yinan, and S. Staab, HGE: Embedding temporal knowledge graphs in a product space of heterogeneous geometric subspaces, *AAAI*, 2024.

13. B. Xiong, **M. Nayyeri**, L. Luo, Z. Wang, S. Pan, and S. Staab, NESTE: Modeling nested relational structures for knowledge graph reasoning, in *Proceedings of the AAAI Conference on Artificial Intelligence*, vol. 38, 2024, pp. 92059213.

14. **M. Nayyeri**, Z. Wang, M. M. Akter, M. M. Alam, M. R. A. H. Rony, J. Lehmann, and S. Staab, Integrating knowledge graph embeddings and pre-trained language models in hypercomplex spaces, in *International Semantic Web Conference*, Springer, 2023, pp. 388407.

15. B. Xiong, **M. Nayyeri**, D. Daza, and M. Cochez, Reasoning beyond triples: Recent advances in knowledge graph embeddings, in *CIKM*, 2023, pp. 52285231.

16. B. Xiong, **M. Nayyeri**, S. Pan, and S. Staab, Shrinking embeddings for hyper-relational knowledge graphs, in *ACL 2023 Long Papers*, pp. 1330613320.

17. **M. Nayyeri**, B. Xiong, M. Mohammadi, M. M. Akter, M. M. Alam, J. Lehmann, and S. Staab, Knowledge graph embeddings using neural Itô process: From multiple walks to stochastic trajectories, in *Findings of ACL*, 2023, pp. 71657179.

18. C. Gregucci, **M. Nayyeri**, D. Hernández, and S. Staab, Link prediction with attention applied on multiple knowledge graph embedding models, in *Proceedings of the ACM Web Conference*, 2023, pp. 26002610. (Equal contribution)

19. Zhu, Y., Potyka, N., Xiong, B., Tran, T. K., **Nayyeri, M.**, Staab, S., and Kharlamov, E. (2023). Towards Statistical Reasoning with Ontology Embeddings. ISWC (Posters/Demos/Industry), 3632.

20. He, Y., **Nayyeri, M.**, Xiong, B., Zhu, Y., Kharlamov, E., and Staab, S. (2023). Can Pattern Learning Enhance Complex Logical Query Answering?. ISWC (Posters/Demos/Industry), 3632.

21. J. Pan, **M. Nayyeri**, Y. Li, and S. Staab, Do temporal knowledge graph embedding models learn or memorize shortcuts?, in *Temporal Graph Learning Workshop @ NeurIPS*, 2023.

22. B. Xiong, N. Potyka, T.-K. Tran, **M. Nayyeri**, and S. Staab, Faithful embeddings for EL++ knowledge bases, in *ISWC*, Springer, 2022, pp. 2238, best student paper.

23. B. Xiong, C. Michael, **M. Nayyeri**, and S. Staab, Hyperbolic embedding inference for structured multi-label prediction, in *NeurIPS 2022*, 2022.

24. B. Xiong, S. Zhu, **M. Nayyeri**, C. Xu, S. Pan, C. Zhou, and S. Staab, Ultrahyperbolic knowledge graph embeddings, *KDD 2022*, 2022.

25. **M. Nayyeri**, S. Vahdati, M. T. Khan, M. M. Alam, L. Wenige, A. Behrend, and J. Lehmann, Dihedron algebraic embeddings for spatio-temporal knowledge graph completion, in *ESWC*, 2022, pp. 253269.

26. **M. Nayyeri**, C. Xu, M. M. Alam, J. Lehmann, and S. Vahdati, Knowledge graph representation learning using ordinary differential equations, in *EMNLP, oral*, 2021.

27. **M. Nayyeri**, S. Vahdati, C. Aykul, and J. Lehmann, 5* knowledge graph embeddings with projective transformations, in *AAAI*, 2021.

28. C. Xu, Y.-Y. Chen, **M. Nayyeri**, and J. Lehmann, Temporal knowledge graph completion using a linear temporal regularizer and multivector embeddings, in *NAACL*, 2021, pp. 25692578.

29. **M. Nayyeri**, C. Xu, Y. Yaghoobzadeh, S. Vahdati, H. S. Yazdi, and J. Lehmann, Loss-aware pattern inference: A correction on the wrongly claimed limitations of embedding models, in *PAKDD*, 2021.

30. C. Xu, **M. Nayyeri**, S. Vahdati, and J. Lehmann, Multiple run ensemble learning with low-dimensional knowledge graph embeddings, in *IJCNN*, IEEE, 2021, pp. 19.

31. **M. Nayyeri**, S. Vahdati, E. Sallinger, M. M. Alam, H. S. Yazdi, and J. Lehmann, Pattern-aware and noise-resilient embedding models, in *ECIR*, 2021.

32. C. Xu, **M. Nayyeri**, F. Alkhoury, H. Yazdi, and J. Lehmann, Temporal knowledge graph completion based on time series gaussian embedding, in *ISWC*, Springer, 2020, pp. 654671. (Spotlight)

33. **M. Nayyeri**, C. Xu, S. Vahdati, N. Vassilyeva, E. Sallinger, H. S. Yazdi, and J. Lehmann, Fantastic knowledge graph embeddings and how to find the right space for them, in *ISWC*, Springer, 2020, pp. 438455.

34. C. Xu, **M. Nayyeri**, Y.-Y. Chen, and J. Lehmann, Knowledge graph embeddings in geometric algebras, in *2020 International Conference on Computational Linguistics (COLING)*, 2020.

35. C. Xu, **M. Nayyeri**, F. Alkhoury, H. S. Yazdi, and J. Lehmann, Tero: A time-aware knowledge graph embedding via temporal rotation, in *2020 International Conference on Computational Linguistics (COLING)*, 2020.

36. **M. Nayyeri**, X. Zhou, S. Vahdati, R. Izanloo, H. S. Yazdi, and J. Lehmann, Let the margin slide for knowledge graph embeddings via a correntropy objective function, in *IJCNN*, IEEE, 2020, pp. 19.

37. **M. Nayyeri**, S. Vahdati, X. Zhou, H. S. Yazdi, and J. Lehmann, Embedding-based recommendations on scholarly knowledge graphs, in *ESWC*, Springer, 2020, pp. 255270.

38. V. Henk, S. Vahdati, **M. Nayyeri**, M. Ali, H. S. Yazdi, and J. Lehmann, Metaresearch recommendations using knowledge graph embeddings, in *RecNLP Workshop at AAAI*, 2019.

Journal

1. **M. Nayyeri**, Gokce Muge Cil, Sahar Vahdati, Francesco Osborne, Mahfuzur Rahman, Simone Angioni, Angelo Salatino et al. "Trans4E: Link prediction on scholarly knowledge

graphs." Neurocomputing, Elsevier 461 (2021): 530-542.

2. **M. Nayyeri**, C. Xu, M. M. Alam, J. Lehmann, and H. S. Yazdi, Logicenn: A neural based knowledge graphs embedding model with logical rules, *IEEE TPAMI*, 2021.

3. Xu, C., **Nayyeri, M.**, Chen, Y. Y., and Lehmann, J. (2022). Geometric algebra-based embeddings for static and temporal knowledge graph completion. IEEE Transactions on Knowledge and Data Engineering, 35(5), 4838-4851.

4. Alam, M. M., Rony, M. R. A. H., **Nayyeri, M.**, Mohiuddin, K., Akter, M. M., Vahdati, S., and Lehmann, J. (2022). Language model-guided knowledge graph embeddings. IEEE Access, 10, 76008-76020.

5. **M. Nayyeri**, G. Müge Cil, S. Vahdati, F. Osborne, A. Kravchenko, S. Angioni, A. Salatino, D. Reforgiato Recupero, E. Motta, and J. Lehmann, Link prediction using numerical weights for knowledge graph completion within the scholarly domain, *IEEE Access*, 2021.

6. **M. Nayyeri**, M. M. Alam, J. Lehmann, and S. Vahdati, 3D learning and reasoning in link prediction over knowledge graphs, *IEEE Access*, 2020.

7. **M. Nayyeri**, H. S. Yazdi, A. Maskooki, and M. Rouhani, Universal approximation by using the correntropy objective function, *IEEE Trans. on Neural Networks and Learn. Syst.*, 29(9):45154521, 2017.

8. **M. Nayyeri**, A. Maskooki, and R. Monsefi, A new sparse learning machine, *Neural Processing Letters, Springer*, 46(1):1528, 2017.

9. **M. Nayyeri** and H. S. Noghabi, Cancer classification by correntropy-based sparse compact incremental learning machine, *Gene Reports, Elsevier*, 3:3138, 2016.

Teaching Experience

University Of Stuttgart   **Stuttgart, Germany**
Tutor– Machine Learning Course   *2022 – 2023*

University Of Stuttgart   **Stuttgart, Germany**
Tutor– Seminar: Machine Learning with Graphs   *2023*

University Of Stuttgart   **Stuttgart, Germany**
Practical Lead– Deep Learning Lab   *2023 – 2025*

University Of Bonn   **Bonn, Germany**
Practical Lead– Semantic Web Lab   *Summer 2019*

University Of Bonn   **Bonn, Germany**
Practical Lead– Knowledge Graph Lab   *Summer 2020*

University Of Bonn and Stuttgart   **Bonn, Stuttgart, Germany**
Thesis Co-mentor of Master and Bachelor Students   *2018 — Present*

Birjand University of Technology　　　　　　　　　　　　　　　　　　　　**Birjand, Iran**
Lecturer, Department of Computer Engineering　　　　　　　　　　　　　*Sep 2016 – Sept 2017*

Workshop/Tutorial Organizations

- Workshop of Knowledge Representation and Representation LearningJoint with ECAI 2020 https://smartdataanalytics.github.io/KR4L/

- Reasoning beyond Triples: Recent Advances in Knowledge Graph Embeddings– CIKM 2023 Tutorial https://kg-beyond-triple.github.io/

Fudings

- BMBF Project: AI and Simulation for Tumor Liver Assessment (ATLAS)　€245,335

Projects

- ATLAS Project (BMBF): Developing the core AI-based system using graph neural networks and transformer models to provide support and recommendations for experts in diagnosing and treating liver cancer. https://www.ki.uni-stuttgart.de/departments/ac/research/projects/ATLAS/

Peer-Reviewing

NeurIPS, ICLR, ICML, ACL, EMNLP, AAAI, ECAI, ISWC, CIKM, Neural Networks Journal

Talks

- Towards Foundation Models on Temporal Knowledge Graphs, ELLIS Unit Stuttgart Summer Symposium 2025.

Languages

- English: C2
- Persian: Native
- German: A1