

Lauren Nicole DeLong, Ph.D. Candidate in Artificial Intelligence

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EDUCATION:

◆ Ph.D. Candidate in Artificial Intelligence and its Applications *Oct. 1, 2021 - Present*

University of Edinburgh School of Informatics, Edinburgh, United Kingdom

Global Informatics Scholar, under the supervision of Prof. Jacques Fleuriot & Dr. Paola Galdi

Thesis topic: Using and improving approaches in neurosymbolic artificial intelligence (hybrid models between deep learning and symbolic methods, such as logic programs) for biomedical applications

→ Skills and Experiences:

- Logic programming
- Using remote CPU/GPU servers
- Interdisciplinary writing & presentation
- PyTorch
- Deep learning
- Unsupervised learning via clustering
- Analyzing & processing biomedical & clinical datasets (e.g., UK Biobank, ADNI)
- Project leadership

◆ Master (M.Sc.) of Life Science Informatics *Oct. 1, 2019 - Aug. 2021*

Rheinische Friedrich-Wilhelms-Universität Bonn, Bonn, Germany

Fulbright, DAAD, and “Deutschlandstipendium” Scholar; Grade: 1.2 (on a 1.0- 4.0 scale, 1.0 being the best)

Thesis topic: Network representation learning methods for adverse drug reaction prediction

→ Skills and Experiences:

- Genetic sequence analysis
- Chemoinformatic tool kits, such as RDKit
- Using biological and chemical databases
- Molecular modelling and drug design principles
- Software development (Python)
- Classical machine learning algorithms
- Graph neural networks

◆ Bachelor of Science (B.S.): Biology, Minors in Mathematics and Chemistry *Aug. 2015 - May 2019*

Salisbury University, Honors College, Henson School of Science, Salisbury, Maryland, USA

Goldwater Honorable Mention, DAAD RISE Scholar; 3.98/4.00 GPA, Summa Cum Laude

Thesis topic: Assessing the effects of inorganic Arsenic on IL-1 β and TNF α secretion, gene expression, and DNA methylation in murine macrophages to gauge immunotoxic effects

INTERNSHIPS & RESEARCH FELLOWSHIPS:

◆ Data Science Intern, Enveda Biosciences

Boulder, CO, USA (remote)

June 2023 - Aug. 2023

➤ During this recent internship, I designed a neurosymbolic approach, the “Mechanism of Action Retrieval System (MARS)”, to deconvolute drug mechanisms-of-action for drug discovery and repositioning.

→ Skills and Experiences:

- AWS services
- Reinforcement learning
- Tensorflow
- Biomedical knowledge graphs
- Implement parallelization and concurrency
- Dataset processing & analysis

◆ Fulbright Scholar & DAAD Research Fellow,

Fraunhofer Institute for Algorithms and Scientific Computing

Sankt Augustin, Germany

Sep. 2019 - Aug. 2021

- After completing a 10-month Fulbright Research Fellowship, I applied for and received a 6-month DAAD short term grant to continue my research.
- Here, I used graph reasoning methods for side effect prediction and drug target identification.

→ Skills and Experiences:

- Graph learning approaches (e.g., node2vec, R-GCN, & GAT)
- Network analyses
- Supervised learning
- Software development (Python)
- Working with RNA-Seq data
- OrientDB and creating graph databases
- SQL and relational databases
- Using biomedical databases
- Text mining and natural language analyses

SELECTED PUBLICATIONS & PRESENTATIONS:

◆ PUBLICATIONS:

(Google Scholar ID: [tcH2MCQAAAAAJ&hl](https://scholar.google.com/citations?user=tcH2MCQAAAAAJ&hl))

- (Under Revision) **DeLong, L.N.**, Fernández Mir, R., Ji, Z., Whyte, M., and Fleuriot, J.D. (2024). Neurosymbolic AI for Reasoning on Graph Structures. *IEEE Transactions on Neural Networks and Learning Systems*. preprint: <https://arxiv.org/abs/2302.07200>
- (Soon to be submitted) **DeLong, L.N.**, Fleetwood, K., Prigge, R., Guthrie, B., and Fleuriot, J.D. (2024). An investigation into multimorbidity accrual with depression. *PLOS Digital Health*.
- (Soon to be submitted) **DeLong, L.N.**, Gadiya, Y., Fleuriot, J.D., and Domingo-Fernández, D. (2024). MARS: A Neurosymbolic System for Biomedical Mechanism-of-Action Retrieval. *BMC Bioinformatics*.
- Krix, S., **DeLong, L. N.**, Madan, S., Domingo-Fernández, D., Ahmad, A., Gul, S., ... & Fröhlich, H. (2023). MultiGML: Multimodal graph machine learning for prediction of adverse drug events. *Heliyon*, 9(9). doi: <https://doi.org/10.1016/j.heliyon.2023.e19441>
- Schultz, B., **DeLong, L. N.**, Masny, A., Lentzen, M., Raschka, T., van Dijk, D., ... & Fröhlich, H. (2023). A machine learning method for the identification and characterization of novel COVID-19 drug targets. *Scientific Reports*, 13(1), 7159. doi: <https://doi.org/10.1038/s41598-023-34287-5>

◆ PRESENTATIONS:

A: “Neurosymbolic AI Reveals Biases and Limitations in ML-Driven Drug Discovery”

B: “Neurosymbolic AI for Reasoning on Biomedical Knowledge Graphs”

C: “Prioritization and Proposition of Novel COVID-19 Therapies Based on Network Representation Learning”

Conference on Neural Information Processing Systems, Workshop on New

Frontiers of AI for Drug Discovery and Development, Poster Presentation, A

Dec. 2023

International Conference on Machine Learning, Workshop on Knowledge

& Logical Reasoning in the Era of Data-driven Learning, Poster Presentation, B

July 2023

Artificial Intelligence in Bergen, Oral Presentation, B

June 2022

International Society for Computational Biology’s European

Conference on Computational Biology, Poster Presentation, C

July 2021