# Quinn Lanners

Ph.D. Candidate
Department of Biostatistics & Bioinformatics
Duke University

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## Summary

I am a Biostatistics & Bioinformatics Ph.D. candidate at Duke University working with Profs. Cynthia Rudin, David Page, and Alexander Volfovsky. I research the use of machine learning to facilitate interpretable causal inference, with a particular focus on medical applications. My recent work includes estimating dynamic treatment regimes for ICU patients, developing an interpretable method for observational causal inference, and creating a variant of multilabel learning to improve the prediction of rare clinical events. My collaborations span statistics, computer science, medicine, and chemistry. In Summer 2024, I interned as a Research Scientist at Meta where I worked on a domain-adapted model-based approach for offline counterfactual evaluation of ads ranking models. Before starting my Ph.D., I worked as a data scientist at Optum. I functioned as an end-to-end machine learning expert where I built and deployed machine learning models and automated the development team's deployment pipeline. I worked with Prof. Thomas Laurent on deep learning as an undergraduate at Loyola Marymount University. My professional and academic background makes me especially adept at understanding complex concepts and problems and implementing practical solutions across multiple disciplines.

## Academic Affiliation

**Ph.D. Biostatistics & Bioinformatics**
Topic: *Leveraging Machine Learning for Interpretable Causal Inference*
Advisors: Cynthia Rudin, David Page, & Alexander Volfovsky
Dept. of Biostatistics & Bioinformatics, Duke University, 2021-Present

**B.S. Applied Mathematics**, Biochemistry Minor, *Summa cum Laude*
Topic: *Neural Machine Translation & Deep Learning*
Advisor: Thomas Laurent
2019 Program Scholar – Top student in department
Dept. of Mathematics, Loyola Marymount University, 2015-2019

## Publications

**Quinn Lanners**\*, Qin Weng\*, Marie-Louise Meng, and Matthew M Engelhard. Common event tethering to improve prediction of rare clinical events. In *The 40th Conference on Uncertainty in Artificial Intelligence*, 2024

Harsh Parikh\*, **Quinn Lanners**\*, Zade Akras, Sahar Zafar, M Brandon Westover, Cynthia Rudin, and Alexander Volfovsky. Safe and interpretable estimation of optimal treatment regimes. In *International Conference on Artificial Intelligence and Statistics*, pages 2134–2142. PMLR, 2024

**Quinn Lanners**, Harsh Parikh, Alexander Volfovsky, Cynthia Rudin, and David Page. Variable importance matching for causal inference. In *Uncertainty in Artificial Intelligence*, pages 1174–1184. PMLR, 2023

Samantha M McDonald, Emily K Augustine, **Quinn Lanners**, Cynthia Rudin, L Catherine Brinson, and Matthew L Becker. Applied machine learning as a driver for polymeric biomaterials design. *Nature Communications*, 14(1):4838, 2023

Marie-Louise Meng, Yuqi Li, Matthew Fuller, **Quinn Lanners**, Ashraf S Habib, Jerome J Federspiel, Johanna Quist-Nelson, Svati H Shah, Michael Pencina, Kim Boggess, et al. Development and validation of a predictive model for maternal cardiovascular morbidity events in patients with hypertensive disorders of pregnancy. *Anesthesia & Analgesia*, 2022

**Quinn Lanners** and Thomas Laurent. Neural machine translation. Honors thesis, Loyola Marymount University, 2019

\* Denotes co-first authorship.

## Professional Experience

**Duke University**
Ph.D. Candidate | Durham, NC | Aug 2021 - Current

- Developed an interpretable method for estimating dynamic treatment regimes that reduced the probability of an adverse medical event by over 20 percentage points when operationalized on a real-world ICU dataset.
- Engineered a new method for large scale, computationally inexpensive, and interpretable causal inference that is over 100 times faster than existing benchmarks.

**Meta**
Research Scientist Intern | Seattle, WA | May 2024 - Aug 2024

- Wrote an internal technical report detailing a domain-adapted model-based approach for offline counterfactual evaluation of ads ranking models. Work accepted as a short paper to the 2024 Causality, Counterfactuals, & Sequential Decision-Making workshop at RecSys and the 2024 Conference on Digital Experimentation @ MIT.
- Provided empirical and theoretical results showing the settings under which different variants of the proposed approach are better than existing benchmarks.

**Optum**
Data Scientist | Eden Prairie, MN | Jun 2019 - Jul 2021

- Built and deployed a multimodal time-series model assessing the risk of every development team's proposed application update that remains used at the company to present day.
- Detected suspicious activity as lead python programmer for fraud investigation in the payout of the U.S. Government's COVID-19 HHS CARES Act Provider Relief Fund facilitated by Optum.
- Automated development team's Jenkins environment by creating customizable `Jenkinsfiles` to deploy machine learning models to `Kubernetes`.
- Summarized bank transaction and account activity logs into feature vectors using `PySpark`, and used Spark's `MLlib` library to detect irregular account activity.

Data Scientist Intern | Eden Prairie, MN | Jun 2018 - Aug 2018

Big Data Intern | Eden Prairie, MN | Jun 2017 - Aug 2017

# Teaching Experience

*Teaching Assistant*, Software Tools for Data Science, Duke University, Durham, NC. Spring 2023

*Teaching Assistant*, Statistical Program for Big Data, Duke University, Durham, NC. Fall 2022

*Teaching Assistant*, Data Analytics and Visualization, Trilogy Education Services, St. Paul, MN. Aug 2019 - Mar 2020

*Teaching Assistant*, Deep Learning, Loyola Marymount University, Los Angeles, CA. Fall 2018

*Tutor*, Calculus I,II, & III, Loyola Marymount University, Los Angeles, CA. Jan 2018 - Dec 2018

*Teaching Assistant*, Research & Exhibition, Loyola Marymount University, Los Angeles, CA. Fall 2017

*Teaching Assistant*, Introdution to Honors, Loyola Marymount University, Los Angeles, CA. Fall 2016

# Awards & Achievements

National Science Foundation (NSF) Graduate Research Fellowship Program (GRFP), *Honorable Mention*, 2022

James B. Duke Fellowship ($20,000), Duke University, 2019 - 2023

NSF National Research Trainee (NRT), *AI for Understanding and Designing Materials* ($100,000), 2019 - Present

Trustee Scholar ($350,000) – Merit-based full tuition room and board scholarship, Loyola Marymount University, 2015 - 2019

Program Scholar, Loyola Marymount University Department of Mathematics, 2019

Alpha Sigma Nu Merit-Based Jesuit Honors Society Member, 2019

Intrafraternal Scholar of the Year, Loyola Marymount University, 2018

## Short Papers

Mohamed A Radwan, Himaghna Bhattacharjee, **Quinn Lanners**, Jiasheng Zhang, Serkan Karakulak, Houssam Nassif, and Murat Ali Bayir. Counterfactual evaluation of ads ranking models through domain adaptation. In *Causality, Counterfactuals & Sequential Decision-Making workshop at RecSys*. arXiv:2409.19824, 2024

## Conference Presentations

**Quinn Lanners**, Harsh Parikh, Cynthia Rudin, Alexander Volfovsky, and Caleb Miles. Combining rct and observational study data in the presence of unmeasured confounding. Presented at the Joint Statistical Meetings in Portland, OR, USA, 2024

**Quinn Lanners**, Harsh Parikh, Alexander Volfovsky, Cynthia Rudin, and David Page. Flexible almost-exact matching for trustworthy causal inference. Presented at the Joint Statistical Meetings in Portland, OR, USA, 2024

**Quinn Lanners\***, Qin Weng\*, Marie-Louise Meng, and Matthew M Engelhard. Common event tethering to improve prediction of rare clinical events. Spotlight presentation at The 40th Conference on Uncertainty in Artificial Intelligence in Barcelona, Spain, 2024

Harsh Parikh\*, **Quinn Lanners\***, Zade Akras, Sahar F. Zafar, M. Brandon Westover, Cynthia Rudin, and Alexander Volfovsky. Estimating trustworthy and safe optimal treatment regimes for treating seizures in critically ill icu patients. Presented at Duke Health Data Science Showcase in Durham, NC, USA, 2023

**Quinn Lanners**, Harsh Parikh, Alexander Volfovsky, Cynthia Rudin, and David Page. Variable importance matching for causal inference. Presented at INFORMS Annual Meeting in Phoenix, AZ, USA, 2023

**Quinn Lanners**, Harsh Parikh, Alexander Volfovsky, Cynthia Rudin, and David Page. Matching using feature importance: An auditable approach to causal inference. Presented at International Conference of Computational Social Science in Copenhagen, Denmark, 2023

**Quinn Lanners**. Neural machine translation. Presented at Optum Analytics Conference in Eden Prairie, MN, USA, 2019

**Quinn Lanners** and Lambert Doezema. The current state of atmospheric gas concentrations in california. Presented at Southern California Conferences for Undergraduate Research in Pomona, CA, USA, 2017

## Relevant Coursework & Skills

**Programming Languages**: Proficient in Python. Experience with Java (Oracle Certified Associate, Java SE 8 Programmer), R, JavaScript.
**Libraries**: Proficient in Scikit-learn, d3rlpy, Pandas, Numpy, Seaborn, Matplotlib. Experience with PyTorch, PySpark, Tensorflow, Flask.
**Tools**: Proficient in Docker, Jenkins, GitHub, cluster computing (Slurm). Experience with Kubernetes, OpenShift, Amazon Web Services, Hadoop.
**Coursework**: Machine Learning, Probability & Measure Theory, Statistical Inference, Linear Algebra, Artificial Intelligence, Deep Learning, Real and Complex Analysis, Group Theory, Discrete Methods, Organic Chemistry, Biochemistry.

**Other Activities:** Puppy trainer at Whole Dog Institute. Past volunteer work as an EMT at Loyola Marymount University and a clinical research associate at Hennepin County Medical Center.

## References

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**David Page**
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**Lucas Johnson**
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