

ZACHERY BONER

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I am a second-year PhD student at Duke University, advised by Dr. Cynthia Rudin, researching the science of simple machine learning models. I believe that the incorrect patterns and biases encoded by black box machine learning models are dangerous — my primary research objective is to characterize when and why simple models are competitive in terms of accuracy in as general a setting as possible. My goal is to rigorously upend the frequently-false belief that accuracy and interpretability are in opposition for many high-stakes decision domains, and to apply this intuition to develop robust and interpretable for medical applications.

EDUCATION

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| Ph.D. | Duke University, Department of Computer Science Advised by Dr. Cynthia Rudin | August 2023-present |
| BS | University of Virginia, Computer Science | May 2023 |
| BA | University of Virginia, Mathematics (double major) GPA: 3.9 (4.0 Computer Science; 3.8 Mathematics) | May 2023 |

Graduated with Highest Distinction.

Rodman Scholar - UVA Engineering award to top 5% of engineering class on admission.

RESEARCH AND PROFESSIONAL EXPERIENCE

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| Duke University , Durham, NC | August 2023 - present |
| Ph.D. Student: Advised by Dr. Cynthia Rudin | |

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| UVA Center for Advanced Medical Analytics , Charlottesville, VA | March 2021 - May 2023 |
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Research Assistant: Dr. Rich Nguyen and Dr. Christopher C. Moore

- Developed deep learning algorithms to predict bloodstream infection in the ICU (resulted in a first author publication at KDD 2022 Undergraduate Consortium).
- Built machine learning workflow using Python, TensorFlow, and the service Weights and Biases on UVA research computing cloud.

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| Galois, Inc. , Portland, OR | May 2022 - August 2022 |
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Software Engineer/Research Intern

- Researched digital signal processing approaches to malware detection.
- Developed an ontology for verification/validation of human behavior models.
- Designed software to enhance human-machine co-performance in abstract reasoning tasks.

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| Metron, Inc. , Reston, VA | May 2019 – February 2021 |
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Software Engineer Intern

- Developed machine learning algorithms to detect airline flight anomalies.
- Engineered a data pipeline to build time-dynamic graphs of Reddit user interactions.
- Tested, evaluated, and recommended enhancements to algorithms that orchestrate plans for sustained communications and logistics resupply throughout missions.

PUBLICATIONS

Boner Z., Semenova L., Chen H., Rudin C., Parr R. (2024). Using Noise to Infer Aspects of Simplicity Without Learning. *NeurIPS 2024* Main Track.

<https://openreview.net/forum?id=b172ac0R4L>

(25.8% acceptance rate)

Rudin, C., Zhong, C., Semenova, L., Seltzer, M., Parr, R., Liu, J., ... Boner, Z. (2024). Amazing Things Come From Having Many Good Models. Position paper at *ICML 2024*.
<https://arxiv.org/abs/2407.04846>

Parr, R., Rudin, C., Chen, H., Boner, Z., Moshkovitz, M., & Semenova, L. (2024). Transition Noise Facilitates Interpretability. *Workshop on Interpretable Policies in Reinforcement Learning@RLC-2024*.
<https://openreview.net/pdf?id=1G8tdr6eFb>

Boner, Zachery (2023). Imputation of Longitudinal Clinical Data and Risk Prediction of Bloodstream Infection in the Intensive Care Unit; Predictive Analytics in the Critical Healthcare System. *University of Virginia Undergraduate Thesis*.
<https://doi.org/10.18130/M2FZ-Z754>

Boner, Z., Moore, C., & Nguyen, R. (2022). Deep Learning Risk Prediction of Bloodstream Infection in the Intensive Care Unit. Undergraduate Consortium of *ACM SIGKDD*.
https://kdd.org/kdd2022/papers/12_Zachery%20W%20Boner.pdf

PRESENTATIONS AND AWARDS

Presented poster, “Using Noise to Infer Aspects of Simplicity Without Learning” at **NeurIPS 2024** in Vancouver, BC.

Presented spotlight poster, “Amazing Things Come From Having Many Good Models” at **ICML 2024** in Vienna, Austria.

Granted **Undergraduate Consortium Travel Award** to present work on deep learning risk prediction at **KDD 2022** in Washington, D.C.

TEACHING

Fall 2024 TA for CS 671: Theory and Algorithms for Machine Learning.

Made homework problems, designed course final project, organized all discussion sections (and led one), and taught lectures on Occam’s Razor, evaluation metrics for machine learning algorithms, and the Rashomon Effect. Also led office hours weekly and participated in grading.

OTHER

ParadeRest - Website Developer

Alongside UVA Professor Emeritus Dr. Anita Jones, I developed a new website for the organization which provides resources and connects veterans in the local Charlottesville area. The website distills the organization’s messaging and mission and provides easier access to the services provided by ParadeRest for veterans. paraderestva.org

Jefferson Literary and Debating Society – Sergeant at Arms

As an executive member of the Jefferson Literary and Debating Society, I planned and hosted events for a 100+ person organization, ensured people’s safety and wellbeing during meetings, and worked with the executive committee to move the society forward. Outside of my executive role, I was an active member, and I delighted in the opportunity during the Society’s Friday night meetings to sharpen and hone my ideas, develop my public speaking skills, and learn from my peers about fields of study completely disparate from computer science and math.

Classical Guitar

I study and perform the classical guitar under the instruction of Colin Fullerton at Duke University and I am learning the flamenco guitar (and form of music) from Dennis Koster. Formerly instructed by Professor Randy Reed at Duke University.

Duke Club Soccer – Goalkeeper and Team Captain

US Citizen