Ram Goenka

Curriculum Vitae

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Research Interests

Probability Theory, Statistical/Machine Learning, Stochastic Processes, Computational Statistics, Bayesian Analysis, Biostatistics

Education

Aug. 2021 – May 2025 **B.S. Mathematics, B.S. Statistics**, *University of Illinois Urbana-Champaign*
Minor in Computer Science

Research Experience

Aug. 2023 – Present **Undergraduate Research Assistant**, *National Center for Supercomputing Applications*
Mentor: Prof. Rebecca Lee Smith, University of Illinois Urbana-Champaign
- Transformed mathematical and statistical models into interactive RShiny applications to enhance vector control research, funded by the Center for Disease Control (CDC).
- Composed efficient code to process large datasets and create dynamic visualizations, including time series graphs and interactive geographical maps.
- Implemented Generalized Additive Models (GAMs) to analyze data, calculating and displaying key inferential statistics to enhance data interpretation.

Jun. 2024 – Aug. 2024 **Undergraduate Research Assistant**, *Polymath Jr. Research Program*
Mentor: Prof. Alexandra Seceleanu, University of Nebraska-Lincoln
- Collaborated with fellow undergraduate researchers to study if (and how) combining two Macaulay posets in various ways (cartesian, wedge, diamond products) leads to another Macaulay poset.
- Composed algorithms to analyze the additivity of posets and determine if a given poset is Macaulay or not. Implemented these algorithms in Macaulay2 language code for usage.
- Compiled documentation on research findings and key theorems, as well as written code.

Aug. 2023 – Dec. 2023 **Undergraduate Research Assistant**, *Illinois Risk Lab*
Mentor: Prof. Runhuan Feng & Dr. Peixin Liu, University of Illinois Urbana-Champaign
- Conducted research on the evolution, history, and current state of Decentralized Autonomous Organizations (DAOs).
- Compiled findings in a report synthesizing research findings and case studies to provide insightful perspectives on the development and future potential of DAOs.
- Presented research findings to a panel of professors from the Department of Actuarial Science.

Teaching Experience

Aug. 2022 – Present **Undergraduate Teaching Assistant**, *STAT 107: Data Science Discovery*
University of Illinois Urbana-Champaign
- Led Python labs ($\sim$ 30 students) aiding with statistical concepts, programming, and debugging.
- Conducted office hours for students offering guidance on data science concepts, programming, statistical concepts, homework problems, labs, Python micro-projects and exam reviews.
- Composed statistics and programming homework problems in concepts such as hypothesis testing, descriptive statistics, probability, linear regression, and programming in Python.

May 2022 – May 2023 **Undergraduate Teaching Assistant**, *CS 124: Intro. to Computer Science I*
University of Illinois Urbana-Champaign

- Guided students in computer science basics and the Java programming language through office hours and course forums. Hosted quiz-review sessions answering conceptual questions.
- Refined course material ensuring correctness. Recorded homework walk-through's breaking down complex concepts.
- Mentored eight first-time undergraduate TAs to familiarize them with the course interface and methodologies as well as expectations of being a course staff member.

Professional Experience

May 2024 – Aug. 2024 **Data Analytics Intern**, *Synchrony Financial*

- Composed and optimized complex SQL queries to manipulate and aggregate datasets for over 2 million credit accounts for advanced analytics on the recovery strategy and collections team.
- Developed predictive models and conducted statistical analyses using SAS, identifying trends and optimizing debt collection strategies. Utilized findings to identify $20 million in potential gains.
- Compiled findings in concise reports and presented data-driven strategies to senior leadership.

May 2023 – Aug. 2023 **Software Engineering Intern**, *COUNTRY Financial*

- Refactored code for insurance processes and calculations on large datasets from SAS to Python using Pandas, achieving a 15% improvement in performance and speed. Implemented unit tests using PyTest for validation.
- Migrated and deployed on-premises Spring applications to Microsoft Azure Cloud, enhancing efficiency and performance. Documented the Azure deployment process for future company use.
- Developed a proof of concept for an insurance-focused generative AI model using Azure OpenAI and LangChain, training it on relevant insurance concepts and the company database.

Sept. 2022 – Aug. 2023 **Software Engineering Intern**, *National Center for Supercomputing Applications*

- Collaborated with the National Center for Atmospheric Research (NCAR) to develop a web interface for atmospheric chemistry simulations pertaining to aerosol particles.
- Wrote Python code to develop time-series models for tracking aerosol particle concentrations utilizing atmospheric data from NetCDF files, and D3.js for the frontend to display the plots.
- Improved the website backend to support larger file uploads and optimized frontend-to-backend efficiency for fast, accurate and refined plotting of data.

Skills

- **Programming Languages:** Python, R, SQL, SAS, Java, C++, JavaScript, Kotlin, MATLAB
- **Tools:** Pandas, PyTorch, MongoDB, Git, Docker, Microsoft Azure

Selected Coursework

- STAT 385: Statistical Programming Methods (in R)
- STAT 431: Applied Bayesian Analysis
- STAT 432: Basics of Statistical Learning
- STAT 433: Stochastic Processes
- STAT 437: Unsupervised Learning
- MATH 441: Differential Equations
- MATH 442: Intro. to Partial Differential Equations
- MATH 447: Real Variables
- CS 441: Applied Machine Learning
- CS 498DDU: End-to-End Data Science