[Serafina Kamp](#) | Graduate Student Research Assistant

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Education

Sep 2022 - Present	University of Michigan, Ann Arbor, MI College of Engineering Computer Science PhD Student Advised by Benjamin Fish
Sep 2018 - May 2022	University of Michigan, Ann Arbor, MI Honors Program in the College of Engineering B.S.E. in Computer Science, Mathematics Minor, Philosophy Minor GPA 3.76/4.00

Research and Work Experience

Sep 2022 - Present	University of Michigan, Ann Arbor, MI Graduate Student Research Assistant

Overview

I am currently working on a project in understanding sources of discrimination in bargaining games in simple hiring markets. The project began with proving that discriminatory outcomes (i.e., one group of agents gets a higher payoff than another group) exist at equilibrium even though the hiring market began from a symmetric starting point in terms of agent skill levels and power in the bargaining game. This work (to appear -- see publications) established that discrimination can arise *endogenously* while agents learn to bargain in a simple hiring market. We are continuing this work to understand how a learning algorithm converges to such an outcome and in the future we hope to correct this type of discrimination.

Key Achievement/Projects
- Presented initial work at BIAS workshop at ECML PKDD 2023 and work to be published

Jan 2021 - Apr 2022	University of Michigan, Ann Arbor, MI Research Assistant - Fairness in Machine Learning Project

Overview

I worked with Dr. Sindhu Kutty as well as two other students on a project investigating metrics of fairness in machine learning algorithms. We were interested in evaluating the robustness of existing fairness metrics against regularization and slight perturbations of the testing set via bootstrap sampling. We designed several experiments to evaluate the robustness of fairness metrics and empirically found that the equal opportunity constraint lacks robustness. We used the COMPAS, South German Credit, and Bank Marketing datasets in our experiments to confirm our conclusions across multiple domains.

Key Responsibilities
- Replication of results from papers we find during our literature review
- Aiding in designing experiments to effectively test for robustness of fairness metrics
- Creation of plots to communicate results of experiments

- Preparing posters for our results to present at conferences

Key Achievement/Projects
- Selected to compete in the ACM SRC at GHC and won first place in the undergraduate category
- Paper published in *Proceedings of ECMLPKDD 2021 Selected Workshops Papers*

May 2021 - Aug 2021   Vectorform, Royal Oak, MI
            Machine Learning Intern

Outline
I worked on a project where we were interested in predicting the electric load at gas plants based on historical values and weather forecasts. I took the lead in identifying potential models for this problem as well as which weather features would be most useful in making our predictions through a literature review. I then implemented several of the models in python and created graph visualizations of the predictions to present to my manager. Finally, we used Microsoft Azure to automatically select and train a model with the data we collected to use as a benchmark to the models I had developed. We found that my models performed very similarly to the Azure trained models.

Key Responsibilities
- Collected data from national databases and internal servers to gather historical insights to use in the training models.
- Met with representatives from weather service providers to determine which service would best forecast the information desired from our client.
- Identified and implemented potential solutions to load forecasting through research papers.

Key Achievement/Projects
- Discovered two models that led to success for forecasting electric load, benchmarked by the Microsoft Azure model.
- Developed technical documentation to track project methodology and results.
- Completed Microsoft Azure AI Fundamentals course and obtained certification.

Jan 2021 - Apr 2021   HRL Laboratories, Malibu, CA
            Undergraduate Intern

Outline
I worked under Thaddeus Ladd for a semester on a project involving the implementation of Quantum Network repeater protocols. I learned about the protocols that I was tasked with implementing through reading academic papers. I read several papers to become more familiar with the field and help identify realistic parameters to use in my simulations. I leveraged the SeQUeNCe code base to implement the protocols and run simulations. By the end of the project, I was able to replicate expected results of the protocols based on the initial paper I read.

Key Responsibilities
- Writing simulations for Quantum Network repeater protocols in Python to evaluate the efficiency of network topologies.
- Reading academic papers for protocol implementation details including identifying realistic hardware parameters.

May 2020 - Jan 2021   Summer Undergraduate Research Experience, Ann Arbor, MI
            Research Assistant

Outline

I was an undergraduate research assistant on this project team to help improve a machine learning algorithm related to automatically extracting information from tables stored in PDFs. To improve the algorithm, I focused on comparing our method with other popular object detection methods. From this I was able to understand the limitations of our model and create a combined model of our current method and the YOLOv3 architecture. This improved the results of our larger information extraction algorithm and reduced the execution time. I am currently continuing with this project on a different task of writing a survey paper about the state-of the art techniques used in the task of text extraction from online documents.

Key Responsibilities
- Assisted in improving table detection machine learning algorithm by collecting and annotating training data for existing methods and evaluating current methods by comparing to other well-known methods in the area
- Compared current techniques with other popular object detection architectures, YOLOv3 and FRCNN, through literature review and implementation of these techniques for the task of table detection
- Conducted a thorough literature review on and summarized the main techniques of relation extraction as part of a larger survey paper on the field of text extraction

Key Achievement/Projects
- Collected and annotated 2,000 table images to improve existing CNN in the task of table detection on technical manuals
- Found that performance could be improved by combining the YOLOv3 architecture with our current methods since the union of the areas proposed by the two networks covered the most table areas
- Published paper in Array journal

Jan 2019 – Dec 2019   Secure Cloud Manufacturing, Ann Arbor, MI
                             Research Assistant

Outline

I was an undergraduate research assistant on this Multidisciplinary Design team during my freshman/sophomore year. As a member of the cloud and security team I was responsible for data handling at our local testbed before transitioning into helping assess the security of our overall system. For that I conducted a literature review and sketched a threat model for hypothetical decision making software in our system. I delivered weekly written and oral reports along with my subteam as well as longer midterm and final presentations to communicate our progress.

Key Responsibilities
- Collaborated in a Multidisciplinary Design team to investigate the security of cyber physical systems in manufacturing processes
- Created threat model to assess vulnerabilities in a hypothetical decision making software connected with the physical manufacturing testbed

Key Achievement/Projects
- Developed a local API in Java to handle data retrieval and processing from the testbed

- Assisted in setting up a gRPC server in Java on the local testbed which communicated with the above local API to allow for remote access of data
- Presented poster at Design Exposition at University of Michigan

Teaching Experience

Jan 2021 – Apr 2022   University of Michigan, Ann Arbor, MI
       Introduction to Machine Learning Instructional Aide

Outline

I worked as an instructional aide in an undergraduate introduction to machine learning course. This course covers fundamental machine learning concepts such as common supervised, unsupervised, and deep learning techniques, including the mathematical formulation and the algorithmic implementation.

Key Responsibilities
- Facilitated a discussion section to reinforce concepts learned in lecture
- Provided support to students by answering questions online and in office hours
- Assisted in writing homeworks, projects, and discussion notes

May 2019 – Aug 2019   ID Tech Camp, Ann Arbor, MI
       Instructor

Outline

I worked as an instructor for ID Tech weekly camps where I was responsible for a group of middle-school-aged kids. During each week, I taught core technology game concepts and then worked with each student in developing their own project based on the fundamentals they learned. I delivered lessons through explaining ideas on a whiteboard and also through interactive games.

Key Responsibilities
- Designed week-long lesson plan based on established curriculum
- Taught kids aged 10-12 in courses of (1) video game design and development in RPG maker and (2) Pi-top assembly and coding in python
- Worked with groups of 8-10 kids each week and helped them finish an individual project in the scope of the curriculum

Publications and Preprints

Kamp, S., Nkeng, T., Riquelme, V., Fish, B. Beliefs, Relationships, and Equality: An Alternative Source of Discrimination in a Symmetric Hiring Market via Threats (To appear)

Kamp, S., Zhao, A. L. L., & Kutty, S. (2021, September). Robustness of Fairness: An Experimental Analysis. In Joint European Conference on Machine Learning and Knowledge Discovery in Databases (pp. 591-606). Springer, Cham.

Colter, Z., Fayazi, M., Benameur-El Youbi, Z., **Kamp, S**., Yu, S., & Dreslinski, R. (2022). Tablext: A combined neural network and heuristic based table extractor. *Array*, *15*, 100220.

Presentations

Sep. 2023 - Talk for accepted paper at BIAS workshop at ECML PKDD 2023, Politecnico di Torino

Oct. 2021 - AI Symposium poster presentation, University of Michigan
Sep. 2021 - Talk for accepted poster, Grace Hopper Celebration (GHC) 2021
Dec. 2019 - MDP Design Exposition poster presentation, University of Michigan

Awards

Sep 2021 - First Place Undergraduate Poster in ACM Student Research Competition at GHC
Fa 2018 thru Win 2020 - University Honors and Dean's List
Jul 2020 - Aptiv Scholarship
Aug 2018 - Regent's Merit Scholarship
June 2018 - Channel 7 WXYZ Best and Brightest Award
Feb 2018 - Michigan Affiliate NCWIT Award for Aspirations in Computing

Extracurriculars

Computer Science Engineering Graduates (CSEG) DEI Co-Chair
Organize DEI initiatives for graduate students at the University of Michigan. Volunteer at social events
for current graduate students as well as at outreach events for prospective graduate students.

Algorithmic Fairness Reading Group Organizer
Started and organized the algorithmic fairness reading group at the University of Michigan where we
meet weekly to present on recent papers in the field and have a group discussion to engage with the
work.

Selected Undergraduate Courses

ENGR 100 - Gaming for the Greater Good
Led a group to design and develop a visually accessible video game using the agile process. We created our game in
GameMaker Studio 2. This course also focused on the development of technical communication skills such as writing
a technical manual to support our game and a formal presentation at the end of the course to report our progress.

MATH 389 - Explorations in Math Research
Worked with a team to create programs in python to experimentally test open-ended questions and then support
these results with proofs to develop lemmas or theorems about our observations. We typed our results up as a formal
paper and discussed our results in a blackboard presentation.

STAQ Quantum Ideas Virtual Summer School - June 8th - June 12th, 2020
Week-long course held by Duke University with daily lectures about foundational ideas of quantum computing
including quantum information basics, quantum algorithms, ion traps, superconductors, and error correction.

Skills

Computer Languages - Python, C++, Java, Matlab, R

Interpersonal Skills - Organization, Mentoring, Communication, Collaborative Problem Solving