Kelsey L. Maass

(425)205-0965 | kmaass@uw.edu | github.com/kels271828

RESEARCH INTERESTS

- Applied Linear Algebra, Applied Mathematics, Data Science, Inverse Problems, Machine Learning, Optimization and Variational Analysis, Scientific Computing

EDUCATION

University of Washington, Seattle, WA

Doctor of Philosophy in Applied Mathematics, Advanced Data Science Option — Mar 2021

- Thesis: Optimization Formulations and Algorithms for Cancer Therapy
- Advisors: Aleksandr Aravkin, Minsun Kim

Master of Science in Applied Mathematics — June 2015

- Advisor: Loyce Adams

Association for Women in Mathematics, Society for Industrial and Applied Mathematics

Azusa Pacific University, Azusa, CA

Bachelor of Arts *summa cum laude* in Mathematics, Minors: Philosophy, Spanish — May 2009

Alpha Chi National College Honor Society, Sigma Delta Pi Sociedad Nacional Honoraria Hispánica

COMPUTING SKILLS

- Proficient: Git, Julia, LaTeX, MATLAB, Python
- Competent: Bash, CSS, HTML, Java, JavaScript, Markdown, R, SQL

RESEARCH EXPERIENCE

Institute for Health Metrics and Evaluation, Seattle, WA — Apr 2021 - Present

Postdoctoral Scholar, Mathematical Sciences and Computational Algorithms Group

- Working broadly on method development, implementation, and applications across the IHME.

Pacific Northwest National Laboratory, Richland, WA — June 2019 - Dec 2020

PhD Intern, Physical and Computational Science Directorate, Data Analytics Group

- Merged geographic data sets from OpenStreetMap and Uber Movement to create a graphical representation of the Los Angeles road network with over 300K vertices and 900K edges.
- Developed optimization methods to estimate hourly street-level travel times from summary statistics of Uber trips between traffic analysis zones using data sets with 1M+ entries.
- Proposed a novel graph pseudo-sparsification technique to improve scalability with little loss of accuracy.
- Developed open-source Python package to estimate arterial travel times (https://github.com/arunsv/transec).

University of Washington, Seattle, WA — Sept - Dec 2016

Graduate Research Assistant, Department of Radiation Oncology

- Modeled optimal multi-modality cancer treatment policies using a Markov decision process approach.
- Developed a MATLAB GUI to validate treatment policies (https://github.com/kels271828/cancerMDP).

TEACHING EXPERIENCE

University of Washington, Seattle, WA — Sept 2013 - Mar 2021

Teaching Assistant and Lead Instructor, Department of Applied Mathematics

- Taught linear algebra and numerical analysis course to 100 undergraduate students (Winter 2019).
- Led quiz sections and office hours for graduate and undergraduate courses of 30-140 students.
- Created and graded homework assignments, quizzes, and exams.

Girls Who Code, Bothell, WA — June - Aug 2015

Lead Instructor, AT&T Summer Immersion Program

- Led a 7-week project-based computer science course for 20 high school juniors and seniors.
- Taught topics including programming fundamentals, robotics, web design, and algorithms using Scratch, Python, JavaScript, HTML, and CSS.

Academic Success Tutoring, Mukilteo, WA   Nov 2010 - June 2013
Mathematics and Spanish Tutor
- Provided one-on-one tutoring for middle school and high school students in subjects including Algebra I & II, Geometry, Precalculus, Calculus, and Spanish.
- Taught math section of SAT prep course and assisted in test preparation for the ACT, CogAT, GED, HSPE, ISEE & ITBS.

Escola Andorrana de Segona Ensenyança de Santa Coloma
Andorra la Vella, Andorra   Sept 2009 - June 2010
Fulbright English Teaching Assistant
- Taught English language and American culture at a secondary school in the Principality of Andorra, situated in the Pyrenees mountains on the border between Spain and France.
- Developed curriculum materials and website for future Fulbright grantees to Andorra.

PUBLICATIONS

Maass, K., Kim, M., & Aravkin, A. (2021). A feasibility study of a hyperparameter tuning approach for automated inverse planning in radiotherapy. In preparation.

Maass, K. (2021). Optimization Formulations and Algorithms for Cancer Therapy. PhD thesis. University of Washington.

Khan, A., Sathanur, A.V., **Maass, K.**, & Rallo, R. (2020). A Distributed Travel Time Estimation Capability for Metropolitan-sized Road Transportation Networks. In *Proceedings of the 9th ACM SIGKDD International Workshop on Urban Computing.* UrbComp. http://urban.cs.wpi.edu/urbcomp2020/file/04.pdf

Maass, K., Sathanur, A.V., Khan, A., & Rallo, R. (2020). Street-level Travel-time Estimation via Aggregated Uber Data. In *2020 Proceedings of the SIAM Workshop on Combinatorial Scientific Computing.* (p. 76). SIAM. https://epubs.siam.org/doi/pdf/10.1137/1.9781611976229.8

Maass, K., Kim, M., & Aravkin, A. (2020). A nonconvex optimization approach to IMRT planning with dose-volume constraints. *arXiv preprint arXiv:1907.10712.*

Sathanur, A.V., Amatya, V., Khan, A., Rallo, R., & **Maass, K.** (2019). Graph Analytics and Optimization Methods for Insights from the Uber Movement Data. In *Proceedings of the 2nd ACM/EIGSCC Symposium on Smart Cities and Communities* (p. 2). ACM. https://dl.acm.org/doi/pdf/10.1145/3357492.3358625

Maass, K., & Kim, M. (2019). A Markov decision process approach to optimizing cancer therapy using multiple modalities. *Math. Med. Biol.: A Journal of the IMA.* https://doi.org/10.1093/imammb/dqz004

TALKS & POSTERS

Optimization Models in Machine Learning: Introduction and Examples
- UW eScience Institute NeuroHackademy, Seattle, WA   July 2020
- Tutorial: https://youtu.be/JAZAdpmkXFo
- Materials: https://github.com/neurohackademy/nh2020-curriculum

Street-level Travel-time Estimation via Aggregated Uber Data
- SIAM Workshop on Combinatorial Scientific Computing, Seattle, WA   Feb 2020
- INFORMS Annual Meeting, Seattle, WA   Oct 2019
- Advisors: Arif Khan, Arun V. Sathanur

A Nonconvex Optimization Approach to IMRT Planning with Dose–Volume Constraints
- Fundamentals of Data Analysis Summer School, Madison WI   July 2018
- SIAM Annual Meeting, Portland, OR   July 2018
- UW Data Science Summit (Best Poster), Seattle, WA   Apr 2018
- UW Applied Mathematics Seminar, Seattle, WA   Dec 2017
- Advisors: Aleksandr Aravkin, Minsun Kim

A Markov Decision Process Approach to Optimizing Cancer Therapy Using Multiple Modalities
- ARCS Science and Law: A Forward Thinking Collaboration, Seattle, WA   Feb 2018
- SIAM Conference on Optimization, Vancouver, BC   May 2017
- UW SIAM Chapter's Annual Poster Competition (Second Place), Seattle, WA   Feb 2017
- Advisor: Minsun Kim

Image Deblurring with Blur Learning
- UW Data Science Poster Session (Honorable Mention), Seattle, WA — Feb 2017
- SIAM Annual Meeting, Boston, MA — July 2016
- UW SIAM Chapter's Annual Poster Competition (First Place), Seattle, WA — Feb 2016
- Advisor: Aleksandr Aravkin

The Harmonic Method for Tidal Prediction
- South Seattle College, RST Academy Speaker Series, Seattle, WA — Mar 2017
- UW Applied Mathematics Master's Symposium, Seattle, WA — May 2015
- Advisor: Loyce Adams

ACTIVITIES
- Student Mentor, UW Women in Applied Mathematics Mentorship Program, Spring 2018 & 2019
- Graduate Student Representative, UW Department of Applied Mathematics, 2018 - 2019
- Diversity Committee Member, UW Department of Applied Mathematics, 2017 - 2018
- Webmaster, UW SIAM Chapter, 2017 - 2018
- Outreach Coordinator, UW SIAM Chapter, 2016 - 2017
- Volunteer Instructor, Girls Who Code Club at the UW Women's Center, 2014 - 2018
- Math Fair Volunteer, UW SIAM Chapter, 2013 - 2019

HONORS
- Best Poster, UW Data Science Summit, Apr 2018
- IGERT Data Science Fellowship, UW eScience Institute, 2017 - 2019
- Boeing Fellowship in Applied Mathematics, University of Washington, Spring 2018
- Honorable Mention, UW Data Science Poster Session, Feb 2017
- Second Place, UW SIAM Chapter's Annual Poster Competition, Feb 2017
- First Place, UW SIAM Chapter's Annual Poster Competition, Feb 2016
- Top Scholar Award, UW Graduate School, Winter & Spring 2016
- Dorothy Lewis Simpson Endowment Fellowship, Seattle Chapter ARCS Foundation, 2015 - 2017
- Fulbright English Teaching Assistantship Grant, Principality of Andorra, 2009 - 2010
- Outstanding Senior Award in Mathematics, Azusa Pacific University, May 2009
- Science and Math Scholarship Program, Azusa Pacific University, 2005 - 2007

RELEVANT COURSEWORK
- AMATH 583 High Performance Scientific Computing
- AMATH 582 Computational Methods for Data Analysis
- AMATH 516 Numerical Optimization
- AMATH 515 Fundamentals of Optimization
- AMATH 514 Networks and Combinatorial Optimization
- AMATH 481 Scientific Computing
- CSE 583 Software Engineering for Data Scientists
- CSE 546 Machine Learning
- CSE 512 Data Visualization
- CSE 414 Introduction to Database Systems
- CSE 373 Data Structures and Algorithms
- EE 578 Convex Optimization
- IND E 599 Data-Driven Optimization
- NEURO 511 Intelligent Machinery, Identity, and Ethics
- STAT 509 Econometrics