

Kai M. Hung

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Education

Massachusetts Institute of Technology	Cambridge, MA, USA
Ph.D. in Social & Engineering Systems	05/2029
Rice University	Houston, TX, USA
B.A. in Computer Science, Minor in Statistics (GPA: 3.8 / 4.0)	05/2024

Publications

- [1] Zalles, A., **Hung, K.**, et al. (2024). *An Optimal Transport Approach for Network Regression*. IEEE Conference on Control Technology and Applications.
- [2] **Hung, K.**, Zalles, A., et al. (2024). *Towards Ecological Network Analysis with Gromov-Wasserstein Distances*. ICLR 2024 Workshop on Tackling Climate Change with Machine Learning.
- [3] Zalles, A., **Hung, K.**, et al. (2023). *Network Regression with Wasserstein Distances*. NeurIPS 2023 Workshop on Optimal Transport for Machine Learning.

Posters & Oral Talks

- [3] **Hung, K.**, Lipnick, A., et al. (2023). *Variability Reduction using Optimal Transport*. Talk presented at the New York University AM-SURE Summer Research Symposium.
- [4] **Hung, K.**, Finneran, A., et al. (2023). *A Gromov-Wasserstein Approach for Food Web Network Analysis*. Poster presented at the Rice Undergraduate Research Symposium.
- [5] **Hung, K.**, Yiu, E., Gopnik, A. (2022). *Computational Modeling for Approach-Avoid Task with Reinforcement Learning Frameworks*. Talk and Poster presented at the UC Berkeley SUPERB REU Summer Research Symposium.
- [6] **Hung, K.**, Hegde, V. Sastry, J. (2021). *Gene Expression and Biological Pathways Associated with Differential Responsiveness to Anti-PD1 Immunotherapy in Preclinical HPV+ Tumors*. Poster presented at the CPRIT CURE Summer Research Symposium.

Honors & Awards

- NSF Graduate Research Fellowship 04/2024
- Louise J. Walsh Engineering Scholarship (\$2,500) 08/2023
Awarded annually to the top academically performing students in the George R. Brown School of Engineering.
- Cornell, Maryland, Max Planck Pre-Doctoral Research School 08/2023
- Rice Undergraduate Scholars Program Scholarship (\$1,000) 05/2023
Awarded annually to 25 seniors university-wide for the honors research thesis program.

Leadership

Software Developer / Technical Lead @ Rice Apps

- Build **Rice Carpool**, a ride-sharing app with **1031 registered users and 1198 scheduled rides**. Code [here](#).
- Mentored a group of 6 undergrads to learn web development using ReactJS, NodeJS, GraphQL, MongoDB stack.
- Leading a team of 6 developers to build a donation impact calculator for the United Way of Houston.

Head Peer Academic Advisor

- Led the curation of a 67-paged academic advising guide with advice spanning all 50+ majors at Rice.
- Organized academic advising events for ~300 students annually, include 1:1 course planning consultation.
- Connected URM students to funding for Grace Hopper Conference, Google CS Research Mentorship Program, a 3-day workshop to combat gender imbalance in CS research hosted by CMU, etc.

Teaching Assistant | STAT 310 (Fall '21), STAT 315 (Spring '22), COMP 382 (Fall '22)

- Instructed weekly lab sessions on data science using the R programming language.
- Verified midterm solutions, created midterm rubric, and monitored Piazza for 200+ student algorithms course.

Research Experience

Research Assistant | Optimal Ensemble Lab, [Rice University](#) 08/22 - Now
Advisor(s): Dr. César A. Uribe, Dr. Lydia Beaudrot | [Poster](#), Paper [1, 2, 3]

- Investigating the **Gromov-Wasserstein (GW) distance as a graph (pseudo)metric for downstream, interpretable machine learning methods over ecological networks** [1].
- Proposed species matching application of Gromov-Wasserstein optimal transport (OT) plans [1].
- Co-developed a novel network regression model by leveraging Bures-Wasserstein distance as an inner metric in Fréchet regression; achieved **state-of-art performance on network-based approach to predict NYC taxi traffic with COVID-19 infection counts** [2, 3].
- Developed notebooks for ecologists to leverage OT for food webs, features include GW dimensionality reduction, classification, and species feature supplemented approximations of OT plans [1].

AM-SURE Intern | Courant Institute of Mathematical Sciences, [New York University](#) 05/23 - 07/23
Advisor(s): Dr. Esteban G. Tabak | [Report](#), [Slides](#), [Code](#)

- **Developed algorithm for computing barycenter of conditional distributions in semi-supervised setting.**
 - **Motivation:** Often, we want to filter out the effect, or variability, of “unwanted” features: batch effect in medical testing or demographic attributes in fairness-critical applications.
 - Yet, exact pairings of data to unwanted features are not always known. My method aims to address this gap.
- Implemented software modules for hyperparameter scheduling, convergence metrics, and visualization of barycenter optimizer progression in Python.
- Leveraged finite difference approximation tests to verify analytically derived gradients.

Berkeley AI REU Intern | [University of California, Berkeley](#) 05/22 - 08/22
Advisor(s): Dr. Alison Gopnik, Eunice Yiu | [Poster](#), [Slides](#), [Code](#)

- Developed a suite of **Q-Learning models with cognitive psychology motivated parameters** to capture differential learning patterns between children and adults in an approach-avoid task.
- Implemented a pythonic pipeline for parameter estimation (inverse RL) of human subject policies.
- Achieved **55% performance bonus** (earned rewards) **than baseline epsilon-greedy Q-Learning** model.

Research Assistant | Computational Wellbeing Group, [Rice University](#) 08/21 - 05/22
Advisor(s): Dr. Akane Sano

- Conducted exploratory data analysis on a multimodal dataset of 49 clinical participants’ PC usage, mobile device usage, and mental check-in surveys towards modeling productivity.
- Identified statistical significant correlation between missing productivity scores and lower sleep time, work hours, and self-perceived mental fatigue.

CPRIT-CURE Intern | [The University of Texas MD Anderson Cancer Center](#) 06/21 - 08/21
Advisor(s): Dr. Jagan Sastry, Dr. Venkatesh Hegde | [Poster](#)

- Analyzed RNA-sequencing data using R to identify causal factors for cancer treatment discrepancy.
- **Identified 485 differential expressed genes** and 4 biological pathways **contributing to 54% sustained tumor regression in anti-PD1 immunotherapy treatment.**

Skills

Programming Languages: Python, C, R, Typescript, Golang, Javascript, Java, SQL, GraphQL

Libraries & Frameworks: PyTorch, NetworkX, Scikit-Learn, Pandas, ReactJS, PySpark

Tools: Jupyter Notebooks, AWS (Lambda & EC2), MongoDB, Git, Linux

Foreign Languages: Chinese (Mandarin, Cantonese), Japanese