

Kai M. Hung

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Research Interests: Statistical Learning, Network Science, Optimal Transport, AI for Healthcare

Education

Rice University

Houston, TX, USA

B.A. in Computer Science, Minor in Statistics (GPA: **3.92/4.0**)

05/2024

Publications

- [1] Zalles, A., **Hung, K.**, et al. (2023). *Network Regression with Wasserstein Distances*. NeurIPS 2023 Workshop on Optimal Transport for Machine Learning.

Posters & Oral Talks

- [2] **Hung, K.**, Finneran, A., et al. (2023). *A Gromov-Wasserstein Approach for Food Web Network Analysis*. Poster presented at the Texas Colloquium on Distributed Learning.
- [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

- Louise J. Walsh Engineering Scholarship (\$2,500) 08/2023
Awarded annually to the top academically performing seniors in the George R. Brown School of Engineering.
- Cornell, Maryland, Max Planck Pre-Doctoral Research School 08/2023
Selected as participant for an international computer science summer research school in Saarbrücken, Germany.
- Rice Undergraduate Scholars Program Scholarship (\$1,000) 05/2023
Awarded annually to 25 seniors university-wide for the honors research thesis program.
- SRCOS Statistics Undergraduate Research Experience 10/2021
Selected as 1 of ~20 participant for a NSF-funded conference to support rising talent in the statistical sciences.

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 Experience

Teaching Assistant | COMP 382 Reasoning about Algorithms

Fall 2022

Teaching Assistant | STAT 315 Probability & Statistics for Data Science

Spring 2022

Teaching Assistant | STAT 310 Probability & Statistics

Fall 2021

Research Experience

Undergraduate Research Assistant | Optimal Ensemble Lab, [Rice University](#)
Advisor(s): Dr. César A. Uribe, Dr. Lydia Beaudrot | [Poster](#), Paper [1]

08/22 - Now

- Investigating the **Gromov-Wasserstein (GW) distance as a graph metric** for downstream, interpretable machine learning methods over ecological networks.
- Analyzed 170 Sub-Saharan African mammal food webs using the **GW Factorization** method, **uncovering two latitudinally motivated clusters under TSNE projection**.
- Achieved **93% classification rate for cycle, path, and star graphs** prior to application on real networks.
- Building a software library for ecologists to leverage OT for food webs, current features include experiment logging, 3D species-interactions network visualization, geospatial visualizations.

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

05/23 - 07/23

- **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 proposed algorithm with a suite of supporting 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](#)
Advisor(s): Dr. Alison Gopnik, Eunice Yiu | [Poster](#), [Slides](#), [Code](#)

05/22 - 08/22

- 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.

Undergraduate Research Assistant | Computational Wellbeing Group, [Rice University](#)
Advisor(s): Dr. Akane Sano

08/21 - 05/22

- Identified correlation of missing self-reported productivity with decline in other productivity-associated metrics (ex. time spend working and happiness) using nonparametric statistical tests.
- Conducted **exploratory data analysis** on participant activity pattern **across PC, mobile, and survey data modalities**: daily website visits, distribution of survey responses, productivity shifts over time, etc.

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

06/21 - 08/21

- 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