Matthew Chen

mattc2371@gmail.com | matt2371 | chenmatthew37

SUMMARY

Ph.D. researcher in Civil and Environmental Engineering with an M.S. in Statistics, studying human-environmental systems using machine learning, reinforcement learning, statistical inference, and scientific computing.

EXPERIENCE

Sep 2022 – Present
Graduate Researcher (NSF Graduate Research Fellow)
University of California, Davis

- **Explainable AI for data-driven reservoir operations [1]**
  - Developed LSTM deep learning models to predict reservoir release decisions across a large sample of U.S. reservoirs
  - Demonstrated whether models are physically justified by uncovering interpretable latent representations of storage using linear probing
- **Projected climate and land-use impacts on water systems [2]**
  - Led a case study of California's Sacramento-San Joaquin watershed to find when changes in the system become statistically detectable in ensemble simulations
  - Studied the influence of climate and land-use scenarios on water supply and flood volume using the Sobol uncertainty decomposition method
- **Modeling groundwater management using multi-agent reinforcement learning**
  - Developed a multi-agent reinforcement learning framework to investigate how groundwater users respond to competition and hydrologic uncertainty
  - Studied effects of emergent behaviors and how they relate to long-term groundwater sustainability

Jun 2024 – Jun 2025
Product Development Data Scientist (Long-term Intern)
Genentech

- Analyzed complex longitudinal datasets supporting four early phase clinical trials using R, SAS, and SQL to produce deliverables including statistical models and clinical datasets, figures, and tables
- Applied Mixed Model with Repeated Measures (MMRM) and implemented multiple covariance structures to assess treatment efficacy
- Spearheaded development of a modular R shiny app to enable stakeholders across multifunctional teams (including Biostatistics, Data Management, and Clinical Science) to quickly explore insights as patient data is updated
- Developed data transformation pipelines and oversaw rigorous quality control, including unblinding workflows in a randomized control trial, to ensure data quality and integrity
- Collaborated with other data scientists to maintain shared code bases and promote Git version control best practices

EDUCATION

2022 – 2027 (expected)
Ph.D., Civil and Environmental Engineering
University of California, Davis — Advisor: Prof. Jonathan Herman

2022 – 2023 **M.S., Statistics**
University of California, Davis | GPA: 4.0

2018 – 2022 **B.S., Civil Engineering**
University of California, Davis | GPA: 4.0

PUBLICATIONS

[1] Matthew Chen and Jonathan D. Herman. Diagnosing latent storage representations in LSTM reservoir release policies. *Water Resources Research*, 62(10), 2026. doi: 10.1029/2025WR043135.

[2] Matthew Chen and Jonathan D. Herman. Detection time for nonstationary reservoir system performance driven by climate and land-use change. *Journal of Water Resources Planning and Management*, 150(4), 2024. doi: 10.1061/JWRMD5.WRENG-6184.

PROFESSIONAL SERVICE

2025 **Reviewer**, *Water Resources Research*

PERSONAL PROJECTS

ML for Solving Differential Equations: Physics-Informed Neural Networks

- Leveraged auto-differentiation to implement custom loss functions that allow neural networks to solve differential equations in fluid mechanics. Obtained R-squared scores of 0.996+ across predicted velocity and pressure fields in a turbulent flow reconstruction problem, given only sparse training observations, i.e., 0.5% randomly chosen data samples in time and space

Causal Inference: Proposition 99 and Synthetic Control

- Estimated causal effects of Proposition 99 on lowering cigarette sales in California using the synthetic control method and randomization inference, controlling for several state-level covariates. Compared findings with Abadie et al., (2010)

TECHNICAL STRENGTHS

Programming	Python, R, SQL, SAS
Scientific Computing	Git/GitHub, Linux/UNIX, High Performance Computing (HPC)
AI/ML	PyTorch, scikit-learn, RLlib, stable-baselines3, NumPy, pandas
Statistics	Statistical inference, regression, time-series analysis, experimental design
Visualization	Matplotlib, seaborn, R Shiny

HONORS AND AWARDS

2024 **NSF Graduate Research Fellowship**
National five year fellowship for high research potential in STEM.

2023 **Outstanding Master's Student Award in Statistics**
Awarded to the highest-performing students in the M.S. Statistics program.

2022 **Dean's Distinguished Graduate Fellowship**
Chosen as one of approx. 25 graduate students at UC Davis awarded PhD funding.

2022 **Outstanding Senior Award**
Recognized for academic excellence and contributions to the learning community.

2018 **Regents Scholarship**
Merit based undergraduate scholarship at UC Davis.