John Cherian

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Education

Ph.D. in Statistics 2020 - 2025 (anticipated)
Stanford University
Supported by the John and Fannie Hertz Foundation Fellowship
Advisor: Emmanuel Candès

B.S. in Mathematical and Computational Science 2013 - 2017
M.S. in Statistics
Stanford University
Graduated with University Distinction and inducted into Phi Beta Kappa

Professional Experience

Consulting Witness 2023 - 2024
Jenner & Block LLP

- Consulting witness on recently concluded gerrymandering litigation
- Work accounts for uncertainty in election outcomes when sampling "fair" redistricting plans

Consultant 2020 - present
The Washington Post

- Designed and implemented night-of election model that forecasts state results from early returns
- 2024 model based on conformal prediction methods developed in PhD research
- Press coverage: Stanford Report, Axios, The Washington Post (2022), The Washington Post (2024)

Scientific Associate 2017 - 2020
D.E. Shaw Research

- Researcher on team developing polarizable force fields for all-atom simulation
- Developed an asynchronous, stochastic least-squares optimizer that outperforms Levenberg-Marquardt based full-batch optimizers on all SciPy benchmarks
- Extended PAC-Bayes generalization bounds to hyperparameter optimization: bound minimization yields efficient algorithm that achieves superior performance on held-out validation data
- Created an efficient method for force field model selection by defining a distance metric for SMARTS patterns (i.e., regular expressions that identify molecular subgraphs) and applying a fused LASSO penalty

Research Assistant 2015 - 2017
Holmes Lab, Stanford University

- Longitudinal analysis of microbiome data tracing the development of oral bacterial samples
- Developed a novel M-(IN)GARCH model for Poisson and Negative Binomial-distributed count data

Research

Research interests: Model-free inference; Algorithmic fairness; Conformal inference; Statistical methods for political science.

Papers

3. Cherian, J.J., Gibbs, I. and Candès, E. J. (2024) Large language model validity via enhanced conformal prediction methods. *NeurIPS*. arXiv:2406.09714
2. Gibbs, I., Cherian, J.J. and Candès, E.J. (2023) Conformal prediction with conditional guarantees. *Major revision at Journal of the Royal Statistical Society: Series B*. arXiv:2305.12616
1. Cherian, J.J. and Candès, E.J. (2024). Statistical inference for fairness auditing. *Journal of Machine Learning Research*. arXiv:2305.03712

Technical reports and posters

6. Cherian, J.J., Bronner, L., Candès, E. (2024). Election night modeling in 2024: a conformal inference approach. *Technical report forthcoming*. Presented at *Stanford-Berkeley Joint Colloquium*.
5. Cherian, J.J., Bronner, L. Lei, L. (2022). Night-of election modeling: a conformal prediction approach. Presented at *Safe Anytime-Valid Inference Workshop*.
4. Cherian, J.J., Bronner, L. (2021). An update to The Washington Post election night model. 2021 technical report.
3. Cherian, J.J., Bronner, L. (2020). How The Washington Post estimates outstanding votes for the 2020 presidential election. 2020 technical report.
2. Cherian, J.J., Taube, A.G., McGibbon, R.T., Angelikopoulos, P., Blanc, G., Snarski, M., Richman, D.D., Klepeis, J.L., Shaw, D.E. (2020). Efficient hyperparameter optimization by way of PAC-Bayes bound minimization. arXiv:2008.06431.
1. Cherian, J.J., McGibbon, R.T., Taube, A.G., Angelikopoulos, P., Klepeis, J.L., Cole, B., Shaw, D.E. (2019). LASSO-ing the atomtyping problem: a statistical method for ligand force field selection. Presented at *American Chemical Society National Meeting*.

Invited and Contributed Talks

Large language model validity via enhanced conformal prediction methods

University of Pennsylvania CS Theory	January 2025
International Conference on Statistics and Data Science (Student Travel Award)	December 2024
CFE-CMStatistics	December 2024
UC Berkeley Statistics	December 2024
Stanford Statistics	October 2024
INRIA Montpellier	October 2024
Joint Statistical Meetings	August 2024
Hertz Foundation Summer Workshop	July 2024

Night-of election modeling: a conformal inference approach

UCLouvain Applied Statistics Workshop	April 2024
STATS305A: Applied Statistics I Lecture	October 2020

Conformal prediction with conditional guarantees

UCLouvain Statistics	April 2024
Stanford Fairness Seminar	October 2023

Statistical inference for fairness auditing
MIT Fairness Seminar September 2023
Joint Statistical Meetings (contributed) August 2023
Hertz Foundation Summer Workshop July 2023
Stanford Fairness Seminar May 2023
CS229M: Machine Learning Theory Lecture November 2022

Software

- **conditionalconformal**, developer, https://github.com/jjcherian/conditionalconformal
  Python package for the conditional conformal method developed in my work.
- **fairaudit**, developer, https://github.com/jjcherian/fairaudit
  Python package for the fairness auditing methods developed in Cherian & Candès (2023).
- **elex-live-model**, contributor, https://github.com/washingtonpost/elex-live-model
  elex-solver, contributor, https://github.com/washingtonpost/elex-solver
  Python packages for The Washington Post's night-of election modeling team.

Service and Teaching Experience

Instructor
STATS 390: Consulting Workshop Summer 2023, 2024
STATS 302: Qualifying Exam Workshop (Theory) Summer 2022

Teaching Assistant
STATS 300B: Asymptotic Statistics Winter 2022, 2024, 2025 (assigned)
STATS 200: Introduction to Statistical Inference Autumn 2023
CS229M: Machine Learning Theory Autumn 2021, 2022
STATS 363: Modern Statistics for Modern Biology Spring 2021
STATS 202: Data Mining and Analysis Autumn 2020

- Recipient of Departmental Teaching Assistant Award for 2023-24

Service
Stanford Statistics PhD Admissions Committee 2024 - present

Open Directions in Statistics 2024 - present

- Co-leading project with Prof. Rob Tibshirani and another PhD student
- Organizing teams of early-career researchers to produce "open problems" documents for their subfields
- Articles will be published in a special issue of *Statistical Science* that we will co-edit

Stanford Department of Statistics Diversity, Equity, Inclusion & Belonging Committee 2023 - 2024

- One of the first two PhD students to join the committee
- Helped design and set up feedback form for department members

Stanford Inclusive Mentoring in Data Science Winter 2021, 2022, 2023, 2024

- Supervised by Prof. Chiara Sabatti
- Mentored undergraduate attending non-research university in data science research

East Palo Alto Tennis & Tutoring 2013 - 2017, 2020 - Present

- Tutor student from under-served school in East Palo Alto twice weekly
- Elementary School Group Tutor of the Year (2014-15)

The Petey Greene Program 2019 - 2020

- Tutor detainees at Rikers Island weekly to prepare them for high school equivalency (TASC) exam

Reading Partners 2018 - 2020

- Tutor students twice weekly in reading at under-served Brooklyn elementary school

References

Available upon request.

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