Nikolaos Ignatiadis - CV

Contact Details

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Research Interests

I am interested in the development of interpretable statistical methods, accompanied by robust software implementations, for the analysis of datasets generated from modern, high-throughput technologies. From a statistical perspective, this interest encompasses Empirical Bayes analysis, causal inference, multiple testing and statistics in the presence of contextual side-information.

Education

Stanford University — Stanford, California, USA

- **Ph.D. in Statistics.** (GPA 4.24) — 09/2016 – present
  Thesis advisor: Stefan Wager
  Thesis title: Nonparametric perspectives on empirical Bayes.

Heidelberg University — Heidelberg, Germany

- **M.Sc. Scientific Computing**, Grade 1.0 — 2015 - 2016
  Thesis advisors: Wolfgang Huber and Enno Mammen
- **B.Sc. Mathematics**, Grade 1.0 with *distinction* — 2011 - 2015
  Thesis advisors: Wolfgang Huber and Rainer Dahlhaus
- **B.Sc. Molecular Biotechnology**, Grade 1.0 — 2010 - 2013

Awards and Fellowships

Ric Weiland Graduate Fellowship in the Humanities & Sciences — 2020 - 2021
This fellowship is awarded to exceptional rising fourth year doctoral candidates in the humanities, social sciences, mathematics, and statistics upon departmental or programmatic nomination.

Departmental Teaching Assistant Award, Statistics Department, Stanford — 2018

iGEM Grand Prize Winner & Best Foundational Advance — 2013
The International Genetically Engineered Machine competition with Team Heidelberg at MIT.

Deutschlandstipendium, Heidelberg University, Germany — 2011 - 2013
This scholarship is awarded to talented and high-achieving students at public and state recognised institutions of higher education in Germany and is supported by the German Federal Government.

Bronze medal at the International Biology Olympiad, Changwon, South Korea — 2010

Journal Publications

1. Ignatiadis, N. and Wager, S. (2021). **Confidence Intervals for Nonparametric Empirical Bayes Analysis.** Journal of the American Statistical Association, Theory & Methods (forthcoming). *Selected as a **discussion paper** by the editors of JASA. The discussion will take place at JSM 2022.*
2. Ignatiadis, N., Saha, S., Sun D. L. and Muralidharan, O. (2021). **Empirical Bayes mean estimation with nonparametric errors via order statistic regression on replicated data.** Journal of the American Statistical Association, Theory & Methods (forthcoming).
3. Ignatiadis, N. and Huber, W. (2021). **Covariate powered cross-weighted multiple testing.** Journal of the Royal Statistical Society: Series B, 83, 720-751.
4. Karacosta, L. G., Anchang, B., Ignatiadis, N., Kimmey, S.C., Benson, J.A., Shrager, J.B., Tibshirani, R., Bendall, S.C. and Plevritis, S.K. (2019). **Mapping lung cancer epithelial-mesenchymal transition states and trajectories with single-cell resolution.** Nature Communications, 1010, 5887.
5. Ignatiadis, N., Klaus, B., Zaugg, J. B. and Huber, W. (2016). **Data-driven hypothesis weighting increases detection power in genome-scale multiple testing.** Nature Methods, 13(7), 577-580.
6. Beer, R., Herbst, K., Ignatiadis, N., Kats, I., *et al.* (2014). **Creating functional engineered variants of the single-module non-ribosomal peptide synthetase IndC by T domain exchange.** Molecular BioSystems, 10(7), 1709-1718.

Conference proceedings

7. Ignatiadis, N. and Wager, S. (2019). **Covariate-Powered Empirical Bayes Estimation.** Advances in Neural Information Processing Systems 32 (NeurIPS 2019).

Preprints

8. Eckles, D., Ignatiadis , N. (corresponding author), Wager, S. and Wu, H. (2021). **Noise-Induced Randomization in Regression Discontinuity Designs.** Working paper. In preparation for submission to Econometrica.
9. Ignatiadis, N. and Lolas, P. (2021). **σ-Ridge: group-regularized ridge regression via empirical Bayes noise level cross-validation.** Working paper.

Invited discussions

International Seminar on Selective Inference (ISSI) December 2020
Discussant of the talk 'Clipper: p-value-free FDR control on high-throughput data from two conditions' by Prof. Jingyi Jessica Li.

Software

R packages in Bioconductor:

- IHW: Independent Hypothesis Weighting for multiple testing with side-information.
- IHWpaper: Companion to the IHW package facilitating reproducibility.

Julia packages in the official registry:

- Aurora.jl: Empirical Bayes mean estimation with nonparametric errors on replicated data.
- Empirikos.jl: Nonparametric empirical Bayes confidence intervals.
- RegressionDiscontinuity.jl: Basic functionality for analyzing sharp regression discontinuity designs.
- SigmaRidgeRegression.jl: σ-Ridge for regression with features that can be partitioned into groups.
- SmoothingSplines.jl: Nonparametric regression using smoothing splines.
- Contributions to Distributions.jl, GLM.jl, Lasso.jl, MultipleTesting.jl and others.

Industry experience

Google AdsMetrics, Mountain View, USA Summer 2019
Data science intern with Omkar Muralidharan, Sujayam Saha and Dennis L. Sun.

Research appointments

Biomedical Informatics, Stanford, California, USA 2021 - Present
Research assistant in the group of Prof. Nigam Shah funded by the NHLBI R01 grant 'Applying statistical learning tools to personalize cardiovascular treatment'.
Statistics Department, Stanford, California, USA 2017 - 2021
Research assistant with Prof. Stefan Wager working on empirical Bayes and causal inference problems.
European Molecular Biology Laboratory, Heidelberg, Germany 2014 - 2016
Research assistant in the group of Dr. Wolfgang Huber.

Talks and Presentations

Confidence Intervals for Nonparametric Empirical Bayes Analysis. December 2021
CMStatistics: Advances in empirical Bayes methodology
Virtual presentation
Noise-Induced Randomization in Regression Discontinuity Designs. November 2021
Fourth Annual Berkeley-Stanford Econometrics Jamboree
UC Berkeley, California, USA
Noise-Induced Randomization in Regression Discontinuity Designs. November 2021
Causal Science Conference
Stanford University, California, USA
Noise-Induced Randomization in Regression Discontinuity Designs. August 2021
Joint Statistical Meetings (JSM): Causal Inference When Resources Are Limited
Virtual presentation
σ-Ridge: group regularized ridge regression via empirical Bayes noise level cross-validation. April 2021
Statistics seminar at Vrije Universiteit (VU) Amsterdam campus
Virtual presentation
Confidence Intervals for Nonparametric Empirical Bayes Analysis. April 2021
International Seminar on Selective Inference (ISSI)
Virtual presentation
Bias-Aware Confidence Intervals for Empirical Bayes Analysis. August 2020
Joint Statistical Meetings (JSM): Causality in Statistical Data Science
Virtual presentation
Covariate-Powered Empirical Bayes Estimation. January 2020

Blue seminar at the European Molecular Biology Laboratory
European Molecular Biology Laboratory (EMBL), Heidelberg, Germany

Covariate-Powered Empirical Bayes Estimation. December 2019
11th International Conference on Multiple Comparison Procedures
National Taiwan University (NTU), Taipei, Taiwan

Bias-Aware Confidence Intervals for Empirical Bayes Estimation. May 2019
Atlantic Causal Inference Conference (ACIC)
McGill University, Montreal, Canada

Covariate powered cross-weighted multiple testing. February 2019
Statistics Industrial Affiliates Conference
Stanford University, California, USA

Covariate-powered cross-weighted multiple testing with FDR Control. February 2018
Workshop: Post-selection Inference and Multiple Testing
Institut de Mathématiques de Toulouse, Toulouse, France

MultipleTesting.jl: Simultaneous Statistical Inference in Julia. June 2017
Lightning talk at JuliaCon
UC Berkeley, California, USA

Data-driven hypothesis weighting increases detection power in genome-scale multiple testing. July 2016
Genome Biology Seminar at the European Molecular Biology Laboratory
European Molecular Biology Laboratory (EMBL), Heidelberg, Germany

Teaching

Instructor at Stanford

STATS 302: Applied Statistics Ph.D. Qualifying Exam Workshop.	Summer 2020

Teaching Assistant (TA) at Stanford

STATS 315B: Modern Applied Statistics: Data Mining.	Spring 2021
STATS 361: Causal Inference.	Spring 2020
STATS 305B: Applied Statistics II.	Winter 2020
STATS 315A: Modern Applied Statistics: Learning.	Winter 2019
STATS 300A: Theory of Statistics I.	Fall 2018
STATS 366 (BIOS 221): Modern Statistics for Modern Biology.	Summer 2017 & 2018, Fall 2019
STATS 218: Introduction to Stochastic Processes II.	Spring 2018
STATS 290: Computing for Data Science.	Winter 2018
STATS 305A: Introduction to Statistical Modeling.	Fall 2017
STATS 191: Introduction to Applied Statistics.	Winter 2017
STATS 141 (BIOS 141): Biostatistics.	Fall 2016

Trainer at EMBL (European Molecular Biology Laboratory)
Introductory Course: Statistical Bioinformatics using R and Bioconductor October 2015

Professional Service

Journal peer review
Annals of Statistics, Bernoulli, Bioinformatics, Bioinformatics Advances, Biometrics, Biometrika, Electronic Journal of Statistics, Journal of the American Statistical Association, Operations Research, PeerJ, Statistical Science

Conference peer review
AISTATS 2021, NeurIPS 2021, ICLR 2022