

Alexander Petersen

Department of Statistics and Applied Probability
University of California
Santa Barbara, CA 93106

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EDUCATION

University of California at Davis, Davis, CA

Graduate GPA: 4.0

Major: Statistics (Ph.D. and M.S.), 2016

Advisor: Hans-Georg Müller

Dissertation: “Transformation methods for density functions and covariance matrices in functional data analysis”

Arizona State University, Tempe, AZ

GPA: 4.0

B.S. Mathematics, summa cum laude, December 2010

Years attended: 2008–2010

Brigham Young University, Provo, UT

GPA: 3.98

Years attended: 2004–2005 and 2007–2008

RESEARCH INTERESTS

Functional Data Analysis, Object-Oriented Data Analysis, Functional and Structural Brain Connectivity, Signal and Image Processing

PROFESSIONAL EXPERIENCE

Assistant Professor

July 2016 – present

Department of Statistics and Applied Probability
University of California Santa Barbara

Courses Taught: Regression Analysis (PSTAT 126) and a graduate course in Functional Data Analysis (PSTAT 262FR)

Graduate Student Researcher

Sep. 2012 – June 2016

Department of Statistics
University of California Davis

Associate Instructor

Sep. 2013 – Dec. 2013, Sep. 2014 – Dec. 2014

Department of Statistics
University of California Davis

Courses Taught: Applied Statistics for Biological Sciences (STA 100)

Teaching Assistant

Aug. 2012 – Dec. 2012, April 2013 – June 2013

Department of Statistics
University of California Davis

Courses: Applied Statistics for Biological Sciences (STA 100), Regression Analysis (STA 108) and Mathematical Statistics (STA 231A, graduate course)

PUBLICATIONS

PUBLISHED/ACCEPTED

Petersen, A. and Müller, H. G. Fréchet regression for random objects with Euclidean predictors. (*Annals of Statistics, forthcoming*)

Petersen, A. (2017). Book Review: Theoretical Foundations of Functional Data Analysis, with an Introduction to Linear Operators. *Journal of the American Statistical Association*, 112(517), 463–464.

Petersen, A., Zhao, J., Carmichael, O. and Müller, H. G. (2016). Quantifying individual brain connectivity with functional principal components for networks. *Brain Connectivity*, 6(7), 540–547.

Petersen, A. and Müller, H. G. (2016). Functional data analysis for density functions by transformation to a Hilbert space. *Annals of Statistics*, 44(1), 183–218.

Petersen, A. and Müller, H. G. (2016) Fréchet integration and adaptive metric selection for interpretable covariances of multivariate functional data. *Biometrika*, 103(1), 103–120.

Chen, K., Zhang, X., Petersen, A. and Müller, H. G. (2015). Quantifying infinite-dimensional data: functional data analysis in action. *Statistics in Biosciences*, 1–23.

Müller, H. and Petersen, A. Density estimation including examples. *Wiley StatsRef: Statistics Reference Online*. New Jersey: Wiley, 2014.

Fewell, J.H., Armbruster, D., Ingraham, Petersen, A. and Waters, J. (2012). Basketball teams as strategic networks. *PloS one*, 7(11), e47445.

Petersen, A., Gelb, A. and Eubank, R. (2012). Hypothesis testing for Fourier based edge detection methods. *Journal of Scientific Computing*, 51(3), 608–630.

SUBMITTED

Petersen, A. and Müller, H. G. Wasserstein covariance for the functional data analysis of multivariate densities. (*Submitted*)

IN PREPARATION

Petersen, A., Chen, C. and Müller, H. G. Associations between intra-regional connectivity distributions in resting state fMRI and cognitive test scores.

Petersen, A., Müller, H.G. and Deoni, S. Fréchet Estimation of Time-Varying Covariance Matrices From Sparse Data, With Application to the Regional Co-Evolution of Myelination in the Developing Brain.

Pigoli, D., Petersen, A., Müller, H.G. and Aston, J. Language Distance Matching by Adaptive Fréchet Integration of Covariance Operators of Acoustic Phonetic Data.

PRESENTATIONS

INVITED TALKS

Fréchet Regression for Random Objects with Euclidean Predictors, EcoSta 2017, Hong Kong, June 2017

FPCA, Regression and Covariance for Random Densities, Geometry, Statistics and Data Analysis, Davis, CA May 2017

Fréchet integration and adaptive metric selection for covariance objects in functional data, Computational and Methodological Statistics, Seville, Spain Dec. 2016

Quantifying Functional Connectivity with Data-Adaptive Covariance Matrices for Multivariate Functional Data, Joint Statistical Meeting, Chicago, IL, July 2016

Representation of Samples of Density Functions and Regression for Random Objects, Department of Statistics, University of Illinois Urbana-Champaign, Champaign, IL, Feb. 2016

Representation of Samples of Density Functions and Regression for Random Objects, Department of Statistics, University of Florida, Gainesville, FL, Jan. 2016

Representation of Samples of Density Functions and Regression for Random Objects, Department of Statistics, Florida State University, Tallahassee, FL, Jan. 2016

Representation of Samples of Density Functions and Regression for Random Objects, School of Mathematical & Statistical Sciences, Arizona State University, Tempe, AZ, Jan. 2016

Representation of Samples of Density Functions and Regression for Random Objects, Department of Statistics and Applied Probability, University of California, Santa Barbara, CA, Jan. 2016

Fréchet Regression for Random Objects, Computational and Methodological Statistics, University of London, London, UK, Dec. 2015

Representation of Samples of Density Functions and Regression for Random Objects, Department of Statistics, Brigham Young University, Provo, UT, Nov. 2015

Edge Detection from Noisy Fourier Data, Computational Mathematics Seminar, School of Mathematical & Statistical Sciences, Arizona State University, Tempe, AZ, Oct. 2010

Jump Discontinuity Detection with Noisy Fourier Data, SIAM Annual Meeting, Pittsburgh, PA, July 2010

CONTRIBUTED TALKS

Wasserstein Covariance for the Functional Data Analysis of Multivariate Densities, Joint Statistical Meeting, Baltimore, MD, Aug. 2017

Functional data analysis for density functions by transformation to a Hilbert space, ICSA/Graybill Conference, Colorado State University, Ft. Collins, CO, June 2015

Detecting Jump Discontinuities Given Noisy Fourier Data, SIAM Conference on Imaging Science, Chicago, IL, April 2010

POSTERS

Quantifying connectivity and brain networks in resting state fMRI with functional data analysis, Alzheimer's Disease Center Research Symposium, Sacramento, CA, Nov. 2014

Interpretable covariances and partial correlations for multivariate functional data with adaptive metrics, Joint Statistical Meeting, Boston, MA, Aug. 2014

PROFESSIONAL SERVICE

REFEREE:

Biometrika
Annals of Statistics
Journal of the American Statistical Association
Journal of the Royal Statistical Society, Series B
Biometrics
Electronic Journal of Statistics
Journal of Computational and Graphical Statistics
Journal of Nonparametric Statistics
Statistics and Its Interface

HONORS AND AWARDS

Outstanding Graduate Research Award, 2015
Summer Graduate Student Researcher Award 2013, 2015
Julius Blum Award, awarded to the highest performing Ph.D. student from the first, second or third years, 2013
UC Davis Graduate Scholars Fellowship, 2011
Dean's List, Arizona State University, all semesters of attendance.
Full-Tuition Academic Scholarship, Brigham Young University 2004–2005 and 2007–2008 academic years.
Dean's List, Brigham Young University, all semesters of attendance.

SPECIAL SKILLS

Computing Skills: Matlab, R, and L^AT_EX. In Matlab, I have extensive experience with neuroimaging packages such as SPM, REST, Brain Connectivity Toolbox and Graph-Theoretical Analysis Toolbox. I have also contributed to the development of PACE 2.17, a Matlab package for functional data analysis (PACE download), and an R package for analyzing samples of density function entitled 'fdadensity' (download from Github).

Foreign Language: Spanish - proficient in speaking, reading and writing. Two years of study followed by residency in Santiago, Chile, from July 2005 to May 2007.