Alexander H. Foss

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Summary

I am an inquisitive, effective, and creative statistician and data scientist with extensive skills in three broad areas. **Statistics and machine learning**, including regression, prediction, hypothesis testing, classification, clustering, and data visualization. **Computing**, including experience with various programming languages (including R, python, BASH, SQL, C, and Go) and experience with high performance computing techniques such as parallel programming, map-reduce, and cluster computing. **Technical communication**, including presentations at international statistics conferences and to colleagues at institutions such as Google, Yale, and the Children's Hospital of Philadelphia.

Education

University at Buffalo **Aug 2012 – Feb 2017 (anticipated)**
Ph.D, Biostatistics GPA 3.9/4.0
Ph.D Thesis advisor: Prof. Marianthi Markatou
M.A. in Biostatistics, conferral date June 15, 2015

University of the South **Aug 2010 – May 2012**
Post-baccalaureate student, Mathematics GPA 4.0/4.0

University of California, Berkeley **Aug 2009 – Mar 2010**
Ph.D Candidate, Psychology GPA 4.0/4.0

Indiana University, Bloomington **Aug 2003 – Aug 2007**
Bachelor of Science in Music and an Outside Field GPA 3.9/4.0
Graduated with High Distinction
Major: Piano Performance
Outside Field: Psychological and Brain Sciences, with Departmental Honors

Experience

University at Buffalo, Dept of Biostatistics, Buffalo, NY
Research Assistant **June 2013 – Present**
Principal Investigator: Dr. Marianthi Markatou

- Developed a novel technique for clustering mixed-type data that outperforms competing methods (Foss et al. 2016) implemented in R/Rcpp and Hadoop
- Worked with collaborators at the University at Buffalo and IBM Watson Labs to develop algorithms for clustering mixed continuous and categorical data subject to measurement error
- Designed, implemented, and analyzed Monte Carlo simulation studies on clusters of up to 200 cores, using R, SQL for data management, and MPI for parallelization

Google, Mountain View, CA
Tech Intern **Summer 2015**
Host: Dr. Ben Davison

- Used theoretical techniques and user data to develop optimal statistical procedures for analyzing user satisfaction
- Contributed high-performance algorithms (Go, JavaScript) for the analysis and visualization of satisfaction data to internal analysis tools
- Gave a talk introducing and justifying these testing procedures to 20+ Google user experience researchers. A 10-year veteran said my talk was one of the best intern presentations he's ever seen.

University at Buffalo, Dept of Biostatistics, Buffalo, NY
Teaching Assistant **Fall 2012, Spring 2013**

- TA for graduate and undergraduate statistics courses
- Led weekly recitation sections, held weekly office hours, graded homework, assisted in grading exams
- Received excellent student evaluations: 94% agreement with the statement "Presents material well," 80% respondents categorizing overall teaching effectiveness as "One of the best" or "Above Average", and comments such as "One of the best TAs I have had so far." (Spring 2013)

University at Buffalo, Dept of Biostatistics, Buffalo, NY
Population Health Observatory
Research Assistant **Summers 2010, 2011, 2012**
Principal Investigator: Dr. Randolph Carter

- Implemented a Monte Carlo simulation in R evaluating published methods of calculating the lifetime risk at birth of Krabbe disease (published 2013)
- Assisted in the writing of grant proposals to the NIDDK and HRSA, as well as an ARRA grant proposal.

New York University, Dept of Applied Psychology, New York, NY
Principal Investigator: Dr. Arnold Grossman
Data Analyst (part-time) **Mar 2011 – June 2012**

- Analyzed associations between domestic abuse, neglect and other variables in elderly LGBT adults, as well as associations between homelessness and traumatic life events in LGBT youth
- Co-author on a paper investigating the relationship between pubertal timing and sexual identity development (published 2014)

University of California, Dept of Psychology, Berkeley, CA
Affective Cognitive Neuroscience Lab
Principal Investigator: Dr. Sonia Bishop
Graduate Student Researcher **Aug 2009 – Apr 2010**

- Assisted in the design and analysis of a functional MRI study investigating neural processing of ambiguous and pure emotions
- Assisted in the writing of an NIMH BRAINS research grant concerning anxiety reduction biofeedback training using real-time fMRI

Yale University School of Medicine, New Haven, CT
Children's Hospital of Philadelphia, Philadelphia, PA
Developmental Neuroimaging Lab
Principal Investigator: Dr. Robert Schultz
Research Assistant (full time) **Jul 2007 – Jun 2009**

- Assisted in the design and analysis of fMRI studies of visual perception and social cognition

Indiana University, Dept of Psychological & Brain Sciences, Bloomington, IN
Cognition & Action Neuroimaging Lab
Principal Investigator: Dr. Karin James
Undergraduate Research Assistant **Sep 2005 – Aug 2007**

- Designed, analyzed, and published results of an fMRI experiment investigating the neural correlates of auditory perception of tone combinations; analysis conducted using BrainVoyager QX (published 2007)

Publications

Submitted:

AH Foss and M Markatou (Submitted). "Clustering Mixed-Type Data in R and Hadoop". In: *Journal of Statistical Software*. Software available at `https://github.com/ahfoss/kamila` and on CRAN.

Published/Accepted:

AH Foss, M Markatou, B Ray, and A Heching (2016). "A Semiparametric Method for Clustering Mixed Data". In: *Machine Learning* (In press). DOI: 10.1007/s10994-016-5575-7

AH Grossman, **AH Foss**, and AR D'Augelli (2014). "Puberty: Maturation, Timing and Adjustment, and Sexual Identity Developmental Milestones among Lesbian, Gay, and Bisexual Youth". In: *Journal of LGBT Youth* 11, pp. 107–124

AH Foss, PK Duffner, and RL Carter (2013). "Lifetime Risk Estimators in Epidemiological Studies of Krabbe Disease: Review and Monte Carlo Comparison". In: *Rare Diseases* 1.2, e25212

AL Barczykowski, **AH Foss**, PK Duffner, L Yan, and RL Carter (2012). "Death Rates in the U.S. due to Krabbe Disease and Related Leukodystrophy and Lysosomal Storage Diseases". In: *American Journal of Medical Genetics Part A* 158A, pp. 2835–2842

AH Foss, EL Altschuler, and KH James (2007). "Neural Correlates of Pythagorean Ratio Rules". In: *Neuroreport* 18, pp. 1521–1525

In progress:

AH Foss and R Carter (In Preparation). "A Non-Linear Factor Model for Non-Normal High-Dimensional Discriminant Analysis". In: *TBA*

AH Foss, M Markatou, and B Ray (In Preparation). "Clustering Mixed-Type Data: Review and Synthesis". In: *TBA*

AH Foss and M Markatou (In Preparation). "MEDEA: A Novel Variable Weighting Scheme for Cluster Analysis". In: *TBA*

Presentations

AH Foss, M Markatou, B Ray, and A Heching (2015). "A Semiparametric Method for Clustering Mixed Data". In: *Joint Statistical Meetings*. Seattle, WA, USA

AH Foss (2015). "Clustering Mixed Continuous and Categorical Data". In: Google Statistics Journal Club. Mountain View, CA, USA

AH Foss, M Markatou, B Ray, and A Heching (2014). "Clustering Mixed Data Subject to Measurement Error". In: *International Society for Business and Industrial Statistics*, ASA Section on Statistical Learning and Data Mining. Durham, NC, USA (Invited Presentation)

Posters

AH Foss, P Duffner, and R Carter (2013). "Lifetime Risk Estimators in Epidemiological Studies of Krabbe Disease: Review and Monte Carlo Comparison". In: *Joint Statistical Meetings*. Montreal, Canada

A Nuñez-Elizalde, **AH Foss**, G Aguirre, and SJ Bishop (2010). "Does he look scared to you? Effects of trait anxiety upon neural dissimilarity measures for ambiguous and pure emotional expressions". In: Vision Sciences Society. Naples, FL, USA

JK Herrington, DW Grupe, ET Hunyadi, CS Shin, **AH Foss**, JM Taylor, and RT Schultz (2010). "Fusiform gyrus and face processing: Intrasubject stability, hemispheric asymmetry, and effective connectivity". In: International Meeting for Autism Research. Philadelphia, PA, USA

AH Foss and KH James (2006). "Music and language processing: Investigating the neural correlates of expertise". In: Human Brain Mapping. Chicago, IL, USA

Academic Honors

- **Two Honorable Mentions, NSF GRF Program** — Spring 2012 and 2013
- Perry Poster Award, University at Buffalo — April 19, 2013
- Presidential Fellowship, University at Buffalo ($23,000) — Fall 2012
- Diebold Fellowship, UC Berkeley Psychology Dept ($14,600) — Fall 2009
- Excellence in Research Award, IU Psychology Dept — April 19, 2007
- Honors Thesis Award, IU Honors College — Spring 2007
- Capstone Grant, Howard Hughes Medical Institute ($4,250) — Spring 2006

- Metz Academic Merit Scholarship, IU Honors College ($56,000) Fall 2003
- Merit Scholarship, IU School of Music ($40,000) Fall 2003

Computer Skills

Languages: R, Bash, C, Java, Go, Mathematica, MATLAB, Processing, Python, Visual Basic, HTML, CSS
Software: SPSS, SAS, pdfTEX, Sweave, VIM, OpenOffice/LibreOffice, MS Office Suite, Hadoop
Operating Systems: Windows (98/XP/Vista/7/8), Macintosh (OS9, OSX), Linux (Red Hat, Ubuntu, CentOS)

Selected Coursework

University at Buffalo, PhD Level: Topics in Advanced Modeling, Advanced Categorical Data Analysis, Advanced Survival Analysis, Theory of Linear Models, Limit Theory, Theory of Statistical Inference, Design and Analysis of Observational Studies
University at Buffalo, Master's Level: Regression Analysis, Categorical Data Analysis, Multivariate Data Analysis, Statistics for Bioinformatics, Statistical Comparisons and Associations
University of the South: Multidimensional Calculus, Linear Algebra, Discrete Mathematical Structures, Genomics, Numerical Analysis
University of California, Berkeley: fMRI Methods, Proseminar in Cognition, Brain, and Behavior
Indiana University, Bloomington: Molecular Biology, Abnormal Psychology, Behavioral Neuroscience, Lab in Behavioral Neuroscience, Lab in Neuroimaging Methods

Service/Extracurricular

University at Buffalo Computational Sciences Club
Member, Volunteer Speaker **Summer 2016 – Present**

- Gave a talk on June 1, 2016 entitled "Clustering Mixed Continuous and Categorical Data"

University at Buffalo School of Public Health and Health Professions (SPHHP), Academic Affairs Committee
Committee Member **Sep 2014 – Present**

- Worked with the Senior Associate Dean for Academic and Student Affairs to establish standards for undergraduate, graduate, and post graduate study in the SPHHP
- Issues addressed included the establishment of new programs, new course proposals, academic policies and procedures, admissions, and clinical education policies

New York State Center of Excellence in Bioinformatics and Life Sciences
Volunteer Speaker **July 24, 2012**

- Gave a presentation on face recognition, brain imaging, and autism to a group of exchange students

The Franklin Institute Museum of Science, Philadelphia, PA
Volunteer **Nov 2007 – Oct 2008**

- Conducted science demonstrations including paper-making, the "brain bar" neuroscience exhibit, and the Baldwin 60,000 steam engine simulation
- Interacted individually with children ages 4–16 and their parents

Wonderlab Museum of Science, Bloomington, IN
Volunteer **May 2006 – Jul 2007**

- Conducted "science-on-the-spot" demonstrations
- Interacted individually with children ages 4–12 and their parents

International Service Learning, Kansas City, MO/San Jose, Costa Rica
Volunteer **Mar 10 – 18, 2007**

- Helped set up clinics in Costa Rica in the towns of Tibás and Puntarenas
- Conducted community triage, took patient histories, gave eye examinations, and prescribed reading glasses