BIOGRAPHICAL SKETCH

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NAME: Brokamp, Cole

eRA COMMONS USER NAME (credential, e.g., agency login): brokampr

POSITION TITLE: Research Fellow

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (*if applicable*)	Completion Date MM/YYYY	FIELD OF STUDY
University of Cincinnati	B.S	06/2010	Biomedical Engineering
University of Cincinnati	Ph.D.	04/2016	Biostatistics and Bioinformatics
Cincinnati Children's Hospital Medical Center	Postdoctoral Research Fellow	present	Biostatistics and Epidemiology

A. Personal Statement

As a biostatistician, I have specialized myself in the areas of machine learning and its application to large environmental and clinical datasets. Recent democratization of "big spatial data" and advances in geoinformatics have allowed for linkage of geographic and demographic data to electronic health records and research cohorts. My expertise in open source spatial data tools like GDAL, GEOS, and PROJ.4 will allow for efficient and transparent assembly of the proposed dataset. Futhermore, my experience with machine learning, including theoretical contributions to random forest methodology will allow me to lead a team to develop the optimal predictive algorithm for personal socioeconomic status. Recent experience with geocoding hospital-wide EHR data will provide me with expertise needed to clean, manage, and apply the training data.

Related Publications:

1. **Cole Brokamp**, MB Rao, Patrick Ryan, Roman Jandarov. A comparison of resampling and recursive partitioning methods in random forest for estimating the asymptotic variance using the infinitesimal jackknife. arXiv preprint arXiv:1706.06150. 2017.
2. **Cole Brokamp**, Roman Jandarov, MB Rao, Grace LeMasters, Patrick Ryan. Exposure assessment models for elemental components of particulate matter in an urban environment: A comparison of regression and random forest approaches. Atmospheric Environment. 151. 1-11. 2017.
3. **Cole Brokamp**, MB Rao, Tina Zhihua Fan, Patrick H Ryan. Does the elemental composition of indoor and outdoor PM2.5 accurately represent the elemental composition of personal PM2.5? Atmospheric Environment. 101:226-234, 2015.

B. Positions and Honors

Positions and Employment

2010–2016 Graduate Research Assistant, University of Cincinnati
2016– Research Fellow, Cincinnati Children's Hospital Medical Center

Honors

2010	B.S. awarded with Distinguished Honors, University of Cincinnati
2016	CCHMC Division of Biostatistics & Epidemiology Travel Award
2016	CCHMC Arnold W. Strauss Fellowship Award
2017	CCHMC Epidemiology & Biostatistics Top Publication
2017	CCHMC Epidemiology & Biostatistics Top Research Achievement

C. Contribution to Science

I recently applied machine learning methods to estimate the exposure of children to different types of air pollution and quantified its effects on their respiratory and mental health. Specifically, I created a novel land use random forest model (LURF) and showed that it was more accurate and precise than traditional land use regression models. This work has been implemented into an R package that helps researchers to extract statistical inferences from random forests, as well as to aid users in the application and visualization of big spatial data.

Related Publications:

1. **Cole Brokamp**, Roman Jandarov, MB Rao, Grace LeMasters, Patrick Ryan. Exposure assessment models for elemental components of particulate matter in an urban environment: A comparison of regression and random forest approaches. Atmospheric Environment. 151. 1-11. 2017.
2. Kelly J Brunst, Patrick H Ryan, **Cole Brokamp**, David Bernstein, Tiina Reponen, James Lockey, Gurjit K Khurana Hershey, Linda Levin, Sergey A Grinshpun, Grace LeMasters. Timing and duration of traffic-related air pollution exposure and the risk for childhood wheeze and asthma. American Journal of Respiratory and Critical Care Medicine. 192(4). 421-427. 2015.
3. Jennifer Kannan, **Cole Brokamp**, David I. Bernstein, Grace K. LeMasters, Gurjit K. Khurana Hershey, Manuel Villareal, James E. Lockey, Patrick Ryan. Parental Snoring and Environmental Pollutants, but Not Aeroallergen Sensitization, Are Associated with Childhood Snoring in a Birth Cohort. Pediatric Allergy, Immunology, and Pulmonology. 0. 2016.

Related Software:

1. Cole Brokamp. (2016, November 3). cole-brokamp/aiRpollution 0.2. Zenodo. http://doi.org/10.5281/zenodo.164697.
2. Cole Brokamp. (2016, June 10). cole-brokamp/RFinfer 0.2. Zenodo. http://doi.org/10.5281/zenodo.50879.

Complete List of Published Work in MyBibliography:

https://www.ncbi.nlm.nih.gov/myncbi/browse/collection/49821426

D. Research Support

Ongoing Research Support

NIH/NIEHS 1R01ES019890-01
Neurobehavioral and Neuroimaging Effects of Traffic Exposure in Children
Ryan, PI (7/1/12 - 3/31/18)
The association between exposure to traffic-related air pollutants (TRAP) during early childhood and neurobehavioral and neuroimaging outcomes has not been thoroughly examined. The objective of the proposed study is to determine if children exposed to increased levels of TRAP during critical time periods of brain development have altered neurobehavior in childhood as measured by a battery of valid and reliable tests and to assess the physiologic impact of TRAP exposure on brain structure, organization, and function using quantitative magnetic resonance imaging (MRI). These results will fill important gaps in current scientific knowledge related to the relationship between TRAP exposure and neurobehavior and central nervous system effects.
Role: Biostatistician

NIH 5K23AI121325
Biomarkers and Risk Stratification in Pediatric Community
Florin, PI (01/01/16 - 12/31/19)
The extensive variation in care, in addition to the lack of evidence-based decision aids, highlights the critical need for an improved understanding of disease severity and tools to guide management for pediatric CAP. The proposed research will address this important knowledge and practice gap.
Role: Biostatistician

U01HG008666
EMERGE: Better Outcomes for Children: Promoting Excellence in Healthcare Genomics to Inform Policy
Harley, PI (09/01/15 - 05/31/19)
We have developed algorithms for the electronic health record (EHR), led the Pediatric Workgroup, developed pharmacogenomics, evaluated the preferences of parents and caregivers to advance genomic medicine and assimilated technical advances into our EHR. The eMERGE effort has become the basic fabric of the institutional initiative to incorporate the extraordinary advances of genetics, genomics and the electronic medical record into healthcare.
Role: Biostatistician

Internal ARC - Cincinnati Children's Hospital
Mother Infant Data Hub
Marsolo, PI (7/1/15 - 7/1/18)
The goals of this award are to create a research database of comprehensive clinical coverage for neonates born throughout the greater Cincinnati area including linkage of medical records to external data sets at the individual- and area-level during the first year of life.
Role: Biostatistician

Internal ARC - Cincinnati Children's Hospital
CARPE DIEM
Ambroggio, PI (7/1/15 - 7/1/18)
The goals of this award are to develop a diagnostic tool based on the urinary metabolome that can differentiate between viral and bacterial community-acquired pneunomia in children.
Role: Biostatistician

Internal - University of Cincinnati
Epidemiology of Rural/Urban Disparities in Stroke
Jasne, PI (1/1/17 - 12/31/17)
The goal of this project is to identify stroke incidence disparities among rural and urban geographic areas.
Role: Biostatistician

Recently Completed Research Support

Internal Processes and Methods Award - Center for Clinical & Translational Science & Training
Validating a Geocoding Approach for Multi Site Studies
Brokamp, PI (1/24/17 - 6/30/17)
The primary objective of this award is to compare the geocoding (assigning latitude and longitude coordinates to addresses) accuracy of our software DeGAUSS (DEcentralized Geomarker Assessment for mUlti Site Studies) to with other common geocoding software. Furthermore, each method will be evaluated based on it ability to correctly estimate environmental exposures and community-level characteristics.
Role: PI

Internal Arnold W. Strauss Fellowship Award - Cincinnati Children's Hospital
Assessing Exposure to Air Pollution Across Time and Space
Brokamp, PI (7/1/16 - 6/30/17)
The primary objective of this award is to combine satellite-based measurements, land use characteristics, and

meteorologic data to create a hybrid spatiotemporal model for ground level exposure to particulate matter using exact addresses and dates.
Role: PI

HEI 4784-RFA08-1/09-5
Analysis of Personal and Home Characteristics Associated with the Elemental Composition of PM2.5 in Indoor, Outdoor, and Personal Air in the RIOPA Study
Ryan, PI (12/1/12 - 11/30/13)
The purpose of this study is to assess the relationship between concurrent measurements of the elemental composition of PM2.5 in indoor, outdoor, and ambient air and the elemental composition of indoor, outdoor and personal air across individuals and cities. The study will also identify personal, home, and environmental factors significantly associated with specific elements or clusters of elements in PM2.5.
Role: Biostatistician

Academy Health
Community Health Peer Learning Program: Participant Community
Beck, PI (2/1/16 - 6/30/17)
The goals of this project are to reduce by 10% the inpatient bed-day rate for one high risk neighborhood in Cincinnati through interventions promoted by shared data and improved data visualization.
Role: Biostatistician