

2019 Data Science Innovation Lab: Data Science Challenges in Rural Health and Environmental Exposures



Goal

The goal of the 2019 Data Science Innovation Lab is to foster the formation of new interdisciplinary collaborations which will generate creative strategies for addressing challenges associated with the analysis, modeling, and visualization of large-scale data sets associated with rural health. Such challenges arise from multifaceted data structures like networks, maps, and gaps (e.g missing data) or sparsity of data. This Data Science Innovation Lab is intended to bring together expertise from the mathematical, statistical, and biomedical fields, to address interdisciplinary topics in biomedical data science critical to the study at the intersection of rural health and environmental exposures. Rural health and environmental exposures specifically concerns communities in less populated areas of the country where exposure to pollutants, toxins, chemicals, etc have a disproportionate impact on citizen health and wellbeing. The immediate and long-term consequences of these exposures have a direct impact on life quality due to reduced access to health care, policies of local government, health disparities, changes to diet and exercise, and corporate interests. It is anticipated that collaborations formed during the Data Science Innovation Lab will result in new NIH and/or NSF grant proposals to further develop, refine, and test hypotheses and projects ideas.

Description

This Data Science Innovation Lab will promote collaboration between quantitative and biomedical researchers towards the development of novel or significantly adapted models, methods, and approaches for overcoming difficult data science challenges arising from the collection and analysis of rural health data.

The term “biomedical” used here is in the broadest sense to include Behavioral science, Bioinformatics, Biology, Cancer Research, Environmental Health, Epidemiology, Population Science, and Toxicology studies that relate to the understanding of health and disease. Likewise, the term “quantitative” is being used to include Applied Mathematics, Computer Science, Data Science, GIS, Pure Mathematics, and Statistics that relate to the development of better models and approaches to quantify or predict health and disease outcomes.

The study of rural health is a rapidly developing area with the aim of identifying, treating, and preventing disease as well as promoting health by understanding the implications of environmental exposures including climate, pollution and diet for developing personalized treatments. Achieving the potential of utilizing “big data” to transform our knowledge of environmental impacts on rural health will necessitate the integration of data formats, including structured and unstructured data, observational and experimental data, from diverse populations interacting with distinct environments. Integrated data will require the development of computational and analytical methods to enable high-confidence predictions for researchers or doctors with a personalized user interface and experience (UI/UX).

The development of novel analytic methods will undoubtedly be complex due to what is not present (missing data), and also what is implicit, such as an underlying network structure of dependencies or the trends, cycles, or other patterns arising from population data in rural communities. Collaborations between biomedical and quantitative scientists with relevant expertise will lead to better approaches to implementation and interpretation of such information.

At the Data Science Innovation Lab, interdisciplinary teams will work together to ideate and develop pilot projects for tackling selected problems. Potential biomedical topics for the Data Science Innovation Lab range across scales, understanding the impact of environmental exposures on rural communities, developing and applying technology from disparate fields to address challenges in rural health, develop better models to predict rural health outcomes and innovative solutions to improve these outcomes. Topics may lead to new insights and lay the groundwork for future advances in the study of the role of environmental impacts on rural health. Examples could include mapping the influence of industrial activities in farming communities, developing precision medicine in rural communities, predicting the health outcomes in subpopulations of rural communities by integrating environmental exposure data with more traditional clinical or EHR data sources, examination of the role of drugs of abuse on communities with limited access to treatment options, and analyzing the effects of environmental exposure cycles and patterns on health or disease outcomes.

Applications from interested biomedical and quantitative participants at the post-doctoral and junior faculty levels will be critically reviewed for a stated dedication to developing new research ideas and a commitment to collaborative “team” science.

The deadline for applications is March 10, 2019. [APPLY TODAY!](#)