



THE UNIVERSITY OF  
CHICAGO

Department of Statistics  
STATISTICS COLLOQUIUM

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Discovery and Visualization of Latent Structure  
in the Microbiome

MONDAY, January 8, 2018 at 4:30 PM  
Eckhart 133, 5734 S. University Avenue  
*Refreshments before the seminar at 4:00PM in Jones 111*

ABSTRACT

Human microbiomes -- the collections of bacteria living around and within the human body -- are complex ecological systems, and describing their structure and function in different contexts is important from both basic scientific and medical perspectives. Viewed through a statistical lens, many microbiome analysis goals can be framed in terms of discovering and describing latent structure. For example, this structure might reflect sudden environmental shocks that affect certain subsets of species, or may illuminate gradual shifts in community composition. We will survey ideas from the data visualization and probabilistic modeling literatures that we have found useful in identifying and characterizing such structure in the microbiome. On the data visualization front, we will describe the focus-plus-context and linking principles, and introduce a new R package that uses these ideas to facilitate visualization of hierarchies of time series. Then, motivated by the fact that microbiome species abundance data often have effectively low-dimensional evolutionary, temporal, and count structure, we explore the application of basic probabilistic latent variable models, focusing on mixed-membership and matrix factorization techniques. We illustrate and compare both visualization and modeling techniques on a study of the effects of antibiotics on the human gut microbiome. Code and data for all experiments is available publicly online.

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For further information and inquiries about building access for persons with disabilities, please contact Jonathan Rodriguez at 773.702.8333 or send him an email at [jgrodriquez@galton.uchicago.edu](mailto:jgrodriquez@galton.uchicago.edu). If you wish to subscribe to our email list, please visit the following website:  
<https://lists.uchicago.edu/web/subscribe/statseminars>.