

The Hong Kong University of Science and Technology

Seminar on Business Data Science

Department of ISOM

**Poisson Hierarchical Indian Buffet Processes –
with indications for Microbiome Models**

by

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Date: 19 November 2025 (Wednesday)

Time: 10:00am – 11:00am

Venue: Room 1007 (LSK Business Building)

Abstract

We describe Poisson Hierarchical Indian Buffet Processes, designed for complex random sparse count species sampling models that facilitate information sharing across and within groups in various contexts. This model accommodates a potentially infinite number of species (taxa) and unknown parameters, allowing us to learn as more data is gathered within a Bayesian machine learning framework. We focus on the challenging context of microbiome analysis and related ecological species sampling models to address existing gaps in modelling capabilities.

Our model offers a generative process for these phenomena, providing flexible sparse multivariate count models that account for overdispersion while also modelling latent OTU counts. We present tractable methods for sampling and posterior analysis in this complex setting, introducing novel parameters that reflect species abundance as well as alpha and beta diversity. We also provide indications for novel approaches to the formidable problem of unseen entities in future samples.

Bio

Born on the island of Jamaica, Professor Lancelot F. JAMES, along with co-author Hemant Ishwaran, has significantly contributed to popularizing key concepts such as stick-breaking priors, the generalised Chinese restaurant process, and Pitman-Yor processes (which they named). These concepts have been vital in Bayesian nonparametric statistics and related machine learning applications since the early 2000s.

Professor James also developed the Poisson Partition Calculus. This foundational framework is central not only to the analysis of various Bayesian nonparametric models, including latent feature models, but also to developments with broader relevance in Combinatorial Stochastic Processes. In recognition of these and other contributions, he was elected a Fellow of the Institute of Mathematical Statistics in 2008 and a Member of the International Statistical Institute.

All interested are welcome!

For details, please contact ISOM Department.