

## 2010 School Seminar Series

Waikato Management School  
Te Raupapa



# Censoring, Interdependence and Scalability for Dyadic Social Media data

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### Abstract:

Marketers are increasingly interested in understanding how customers interact with each other, how to predict future interactions, and how to leverage these interactions. Technology (e.g. social network software) now allows the direct observation of the existence of connections among customers. A problem is that marketers typically do not observe the full network. Social networking data is often collected during a finite observation period, so some observed connections may not persist in the future, while unobserved connections may appear after observation has ended. Thus, conditioning on observed data alone, without accounting for these unobserved events, can lead to misleading inferences and poor predictions. Also, for a dataset of  $N$  individuals, there are  $N(N-1)/2$  interdependent dyads to consider, so standard models and methods for estimating contact probabilities are intractable for all but the smallest networks.

We present a nonparametric Bayesian framework for modeling censored network data that manages this scalability problem, while accounting for interdependent variation in unobserved customer traits. By exploiting the discreteness of the Dirichlet process, we dramatically reduce the computational burden encountered when estimating models on networked data. Not only does dealing with interdependence and unobserved observations in this way yield an improved model of customer interactions, but it also improves our ability to predict new future contacts. It also provides a conceptual framework to use for a wide variety of marketing activities. We demonstrate the power of our model using a dataset of call records from a major Chinese cell phone service provider.

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