# Working Group on Statistical Learning Seminar

**Title:**       Latent Position Shrinkage Model for Network Data

**Speaker:**   Xian Yao Gwee (University College Dublin)

**Date:**        Mon 19th April 2021 at 12:00PM

**Location:**   Online

**Abstract:** Interactions between people are widely represented using a social network. A latent space model positions each person in the network in a latent space and models the probability of interaction between them as a function of their positions. The choice for the number of dimensions of the latent space has always been an open problem where it is commonly set as 2 just for easier visualization and interpretation. This restriction may limit the model from being able to fully describe the data. The latent position shrinkage model extends the latent space model by adopting the multiplicative gamma process (MGP) prior which intrinsically tries to determine the optimal number of dimensions for the latent space model. The MGP prior allows introduction of infinitely many dimensions, with the variance of the dimension increasingly shrunk towards zero at higher dimension. This allows the model to introduce as many dimensions as required to fully describe the data with the unnecessary extra dimension contributing little to no information. A truncated gamma prior was used to ensure shrinkage across higher dimensions. Markov Chain Monte Carlo algorithm was used to estimate the model parameters under a Bayesian framework. This allows the statistical uncertainty in the latent space to be quantified and graphically represented. Simulation studies are provided to demonstrate the model accuracy with regard to different changes toward the network properties. Application of the model is also shown through a group of 71 lawyers which detail the relation between them.

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