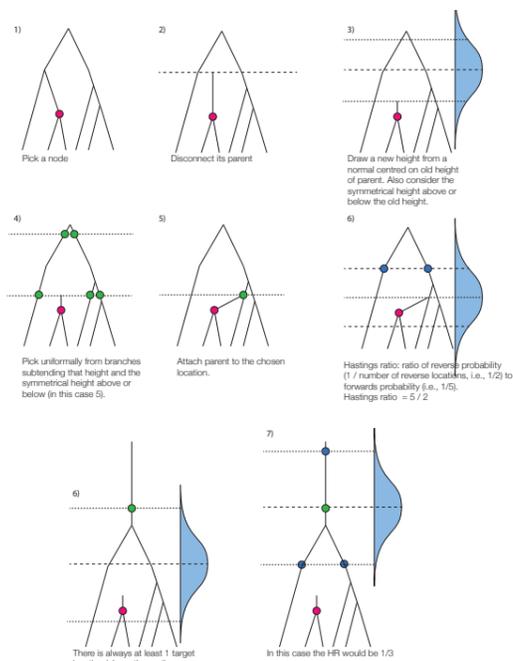


### Programa

14:00 - 15:20 – Luiz Max Carvalho (FGV EMap)

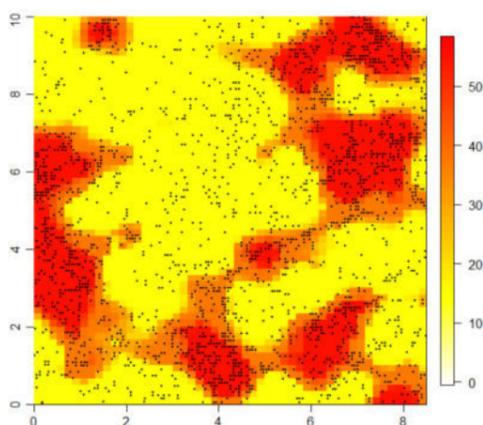
#### *Markov Chain Monte Carlo for phylogenetics: a helicopter ride*



Estimating phylogenetic trees is now a standard tool in fields as diverse as Medicine, Anthropology, Molecular Biology and Epidemiology. Under a Bayesian approach, the central statistical task is to produce a distribution over the space of trees that is compatible with observed data. Since even the simplest toy problems in this area are intractable, simulation-based numerical methods are the go-to solution in order to produce estimates (expectations). Performance is hindered, however, by the fact that treespace is extremely high-dimensional and irregular, with target distributions often being multi-modal. The problem also lacks differential structure, which complicates the use of gradient-based methods such as MALA or HMC. In this talk I shall give a bird's-eye view of the main problems when doing MCMC in treespace, from computation to diagnostics. I will discuss the development of adaptive candidate-generating mechanisms for Metropolis-Hastings-type algorithms, validation strategies to ensure correctness and present ideas on how to measure statistical efficiency.

15:40 - 17:00 – Flávio Gonçalves (UFMG)

#### *Exact Bayesian inference for level-set Cox processes with piecewise constant intensity function*



This work proposes a new methodology to perform Bayesian inference for a class of multidimensional Cox processes in which the intensity function is piecewise constant. Poisson processes with piecewise constant intensity functions are believed to be suitable to model a variety of point process phenomena and, given its simpler structure, are expected to provide more precise inference when compared to processes with non-parametric and continuously varying intensity functions. The partition of the space domain is flexibly determined by a level-set function of a latent Gaussian process. Despite the intractability of the likelihood function and the infinite dimensionality of the parameter space, inference is performed exactly, in the sense that no space discretization approximation is used and MCMC error is the only source of inaccuracy. That is achieved by using retrospective sampling techniques and devising a pseudo-marginal infinite-dimensional MCMC algorithm that converges to the exact target posterior distribution. Computational efficiency is favored by considering a nearest neighbor Gaussian process, allowing for the analysis of large datasets. An extension to consider spatiotemporal models is also proposed. The efficiency of the proposed methodology is investigated in simulated examples and its applicability is illustrated in the analysis of some real point process datasets.

17:00 - 18:00 – Discussão e lanche

### Local

FGV - Auditório 537  
Rua Praia de Botafogo, 190  
Botafogo, Rio de Janeiro, RJ

Os participantes dos seminários **não** poderão acessar as dependências da FGV usando bermuda, chinelos, blusa modelo top ou cropped, minissaia ou camiseta regata.

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