The University of Chicago
Department of Statistics

MASTER'S THESIS PRESENTATION

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Title Methods for Constructing Statistical Model Associated with Movement and Neuron Data

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ABSTRACT

This paper considers the problem of constructing statistical model that describes the relationship between the arm movement of monkey and its neuron firing rate. This estimation statistical model could be a cornerstone for the neurologists and medical professionals research on how the human body movement could be determined by the neurons of brain. In this paper, I first derive the training data set by simulation from *poisson* distribution with λ which is composed of a linear combination with observed covariates, of one or two time dependent intensity functions which are constructed as a linear combination of two kernels centered at different times. I assume the kernels as *gaussian* and volatility parameters of the kernels as known constant. Then, through un-restricted maximization of the Log-likelihood function, I derive the best fit for each parameter of each kernels of the intensity functions in each models. I also check the MSE and standard deviation of the estimated parameters to see how well my model works. After deriving the optimal model, I apply it to the real neuron data and plot the estimated firing rate and compare it to the real neuron data. After that, I assume the kernels conform to *gaussian* distribution but with unknown volatility parameters. Under my previous model framework, I redo the analysis and derive the best model for each neuron data-set. The conclusion is that the model with Gaussian kernel assumption and kernel volatility parameter unknown assumption could produce the best estimation model.

Information about building access for persons with disabilities may be obtained in advance by calling Sandra Romero at 773.702-0541 or by email (sandra@galton.uchicago.edu).