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Dr. Yukie Nagai
Cognitive Development Robotics Lab
International Research Centre for Neurointelligence
The University of Tokyo
7-3-1 Hongo, Bunkyo-ku
Tokyo 113-0033, Japan

Dear Dr. Nagai,

I am writing to you to apply for the postdoctoral researcher position in your lab, as seen on the 'comp-neuro' mailing list. I am a Compututational Neuroscience PhD student in the University of Bristol, England, under the supervision of Dr. Cian O'Donnell. I am due to submit my thesis in June/July of this year. I am particularly interested in the applications of statistical modelling, information theory, and machine learning to neuroscience. Each of these areas will be useful to the CREST Cognitive mirroring project as predictive coding is based upon these concepts.

My academic background is in mathematics and computer science. I completed a 4-year BA in Mathematics in Trinity College Dublin, Ireland in 2011. I also completed an MSc in Informatics in The University of Edinburgh, Scotland in 2015. During the intervening years, I was a financial software consultant. I began my PhD in the University of Bristol in September 2016. My first project during my PhD was a biophysical model of the calcium concentration and fluorescence trace of fluorescent calcium indicators used to detect activity in neurons.

My current reseach uses network science to cluster neurons based on their activity, and compares these clusterings to the neurons' anatomical distribution. I use a cutting-edge cluster detection algorithm that uses hypothesis testing and spectral methods to detect clusters in a network. I also perform these analyses while modelling the neuronal activity as a function of the behaviour of the mouse.

I have done poster presentations on both of these projects at numerous conferences, and both works will be submitted for publication this year.

During the remainder of my PhD, I plan to develop a simple model for the number of spiking neurons in a neuronal population, and extend this into a hierarchical model across multiple brain regions. This model will be based on the Conway-Maxwell-Binomial distribution, which is similar to a binomial distribution, but allows for over- or under-dispersion relative to a binomial distribution.

My teaching experience during my PhD has broadened my horizons by allowing me to learn and teach about machine learning, algorithms, and the practical side of statistics.

As I am interested in researching a model of large neuronal populations I am perfect for this position. I'm interested in being part of the project that produces a tangible productto assist people with developmental disorders.

Sincerely,

Thomas J. Delaney