David Tran

Research Statement

Background and Experience

I am entering the final year of my Bachelor's with a dual in Honors Computer Science and a Major in Mathematics and currently hold the highest standing in the Department of Computer Science. I have experience in machine learning and computational neuroscience research: I was an undergraduate researcher at Western's Brain and Mind Institute under the supervision of Dr. Jörn Diedrichsen with funding from NSERC's USRA. We developed a novel architecture for generating functional parcellations of the cerebellum using fMRI data, which involved conducting research in problems related to Bayesian unsupervised learning, approximate infererence, and hidden Markov models.

Apart from research, I also have professional experience in software engineering. Most recently, I was a software engineer in Silicon Valley at Snowflake, a software company specializing in high-performing and highly-scalable distributed computing. Even as an engineer, my interests lean toward research work: at Snowflake the body of my work was mainly exploratory and experimental, involving the discovery of optimizations for the perfomance of the execution platform.

Current Research Interests

This year, I enrolled in a graduate reading course on spectral geometry taught by Dr. Masoud Khalkhali, which was unfortunately disbanded due to lack of student interest. In spite of this, I have been studying Riemannian manifolds and spectral geometry in a self-directed manner out of interest. As a bonus, I am interested to see if there are connections between the tools used in spectral geometry to study the geometry of manifolds that can be applied to the problems in information geometry found in theoretical machine learning (for example, in relation to the manifold hypothesis).

Additionally, I have been attending the series of talks in quantum computing and quantum information theory throughout the year organized by Dr. Ashgar Ghorbanpour. As a result, my undergraduate thesis in progress, supervised by Dr. Khalkhali, is in the field of quantum information theory, specifically in quantum error-correcting codes. I would like to continue this research throughout the summer.

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