Justin J. Beland

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Education

University of Toronto, 2016 – Present
Doctoral Candidate, Applied Science & Engineering

University of Toronto, 2014 – 2016
Master's Degree, Applied Science & Engineering

Western University, 2009 – 2013
Bachelor's Degree, Physics

Western University, 2007 – 2013
Bachelor's Degree, Engineering

Ph.D. Research

High-Dimensional Bayesian Optimization with Supervised Manifold Learning 2018
My current research focuses on the development of Bayesian optimization algorithms that can be efficiently scaled to high-dimensional black-box minimization problems. The central idea is to exploit novel manifold learning techniques to minimize high-dimensional functions on low-dimensional subspaces. This work can be used to accelerate hyperparameter optimization for deep learning.

Bayesian Optimization Under Uncertainty 2017
This work focused on the development of efficient Bayesian modeling techniques to solve a class of robust optimization problems subject to inequality constraints. The central idea is to maximize acquisition functions that exploit Gaussian process posterior distributions to guide the search towards a robust optimal solution.

Experience

Numeric Methods Researcher, Pratt & Whitney Canada 05.2017 – Present
Implemented tractable Bayesian strategies for optimization under parameter uncertainty. These methods have been applied to real-world high-dimensional engineering design problems. The goal of this project is to facilitate the design of jet engines that are robust to a variety of operating conditions.

Teaching Assistant & Skule Tutor, University of Toronto 01.2014 – Present
Introduced first year engineering and computer science students to fundamental concepts in the Python programming language. Topics include the representation of information, algorithms, IDEs, operating system and software engineering. Duties include preparation, lecturing and grading.

Software Development Consultant, Focal Healthcare 07.2016 – 01.2017
Designed and implemented a system to authenticate patient information from standardized digital imaging and communication files in C#. The purpose of this project was to automate the validation of mixed data structures parsed from a database of patient records.

Intern, Compressor Engineering, Pratt & Whitney Canada 08.2015 – 01.2016
Designed, implemented and tested a data-mining software package used to analyse unstructured data from high-fidelity simulations of engineering designs. This program applied probabilistic modeling techniques to predict the lifespan of critical aircraft engine components.

Technical Skills Languages

Python, C++, C#, MATLAB, HTML, Git, LaTeX, Bash, Unix/Linux, Windows, Mac English, French
TensorFlow, Torch, GPy, GPflow, GPyOpt, spearmint

Awards

University of Toronto fellowship (2014, 2017, 2018), Ontario Student Grant (2017), UTAPS grant (2014), Ontario student opportunity grant (2011, 2012, 2014), Scholarship of distinction (2007)

Publications

[1] J J Beland and P B Nair. "Bayesian Optimization Under Uncertainty", In: *Advances in neural information processing systems workshop for Bayesian optimization for science and engineering* (2017).

[2] J J Beland, M Palaci-Olgun and P B Nair "High-Dimensional Bayesian Optimization with Supervised Manifold Learning", Submission to: *Advances in neural information processing systems* (2018).