Peter D. Thompson

Contact Information

195 Seaton Street, Apartment 2
Toronto, Ontario M5A 2T5
Phone: (416) 668-6957
Email: peter.thompson2881@gmail.com
Github: https://github.com/petethegreat
Website: https://petethegreat.github.io
Linkedin: www.linkedin.com/in/Peter-Thompson-Toronto

Skills

Data Analysis

- During my PhD, analysed ∼2 PB of physics data from the Large Hadron Collider to determine efficiency of the ATLAS jet trigger system.
- Studied test beam data to determine performance characteristics (energy response and resolution) of the ATLAS forward calorimeter.
- Analysed dosimeter data collected from a CT scanner, and compared this with predictions from simulation in order to validate the Monte Carlo simulation.

Programming

- **C++** - Carried out Monte Carlo simulations of ATLAS Forward Calorimeter, and of anthropomorphic phantoms while at Bayer.
- **C++** - Developed ray tracing algorithm to efficiently voxelise a region based on 3d polygonal meshes.
- **C++** - Developed lightweight DICOM viewer to visualise CT data and phantom models using VTK/GTK/GDCM.
- **Python** - Used pandas/numpy to analyse dosimeter data and compare measurements to simulation results.
- **Python** - Retrieved data on Toronto restaurants through Yelp API.
- **Perl** - Parsed data from raw HTML scraped from the web, mapping relevant tags to parameters in LaTeX environments in order to display information in pdf documents.
- **SQL** - Queried application database to extract dose estimates, and to ensure that updated simulation results were correctly imported.
- **MATLAB** - Developed a 3D conductivity model of New Zealand, which was used to predict the electric field induced at the Earth's surface by geomagnetic fluctuations.

Machine Learning/Predictive Modelling

- **Spark** - Trained models to predict Titanic survival probabilities with 77% accuracy using PySpark ML pipeline.
- **R** - Predicted activity classification based on smartphone accelerometer data using a Random Forest, which achieved 99.8% accuracy on a validation set.
- **R** - Used Shiny to develop an NLP web app that predicts the next word following an input string.

Statistics

- Calculated statistical uncertainties and confidence intervals on estimated doses and calorimeter performance characteristics.
- Fit numerous regression curves to a variety of data during my career in physics.

Education Summary

- **Data Science specialisation from John Hopkins University, Coursera.org, 2017**
  Completed a number of projects in R involving statistical inference, machine learning, data visualisation and app development.
- **PhD in Experimental Particle Physics, University of Toronto, 2006-2013**
  Carried out research for the ATLAS experiment at the Large Hadron Collider at CERN, Geneva. My work was related to the forward calorimeter, which measures the energy of particles close to the beam pipe. I analysed test beam data and validated the Monte Carlo simulation of the calorimeter. I also worked on the measurement of the inclusive jet cross section, which determined the rate at which jets (collimated sprays of particles) are produced.
- **MSc in Theoretical Particle Physics, University of Toronto, 2005-2006**
  I studied Heavy Quark Effective Theory, which makes certain calculations possible in cases where heavy quarks (charm, bottom, top) are involved.
- **BSc (Hons) in Space Physics, University of Otago, 2000-2003**
  For my research project, I formulated a system of linear equations to model electric and magnetic fields in and above the Earth. This involved constructing a 3D conductivity map of New Zealand and the surrounding waters. The system was solved in MATLAB, which allowed electric fields at the surface to be predicted from magnetic fluctuations in the upper atmosphere.

Selected Employment History

- **Physicist**
  Bayer Healthcare 2014-2017
  While at Bayer, I worked on Radimetrics Enterprise platform, which is a software product that estimates and tracks the radiation dose delivered to patients undergoing CT examinations. I was responsible for developing the Monte Carlo simulation (in C++), and for analysing the simulation results used to calculate dose estimates. I also carried out analyses in response to customer queries.
- **Teaching Assistant**
  University of Toronto - 2005-2009
  During my studies at University of Toronto, I facilitated laboratory sessions and led tutorial sessions for undergraduate engineering students. This work involved discussing complex physical concepts and technical issues with students. I was nominated for a teaching award for this work.

References Available upon request.