Philippe Sabella-Garnier, PhD

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PROFESSIONAL EXPERIENCE

Postdoctoral Researcher, Theoretical Physics

Leiden University

09/2016 – 08/2020 — Leiden, Netherlands

- Research focused on the intersection of quantum information theory and statistical mechanics.
- Results presented in five publications (three accepted and two currently undergoing review) and multiple international conferences.
- Approx. 100GB of simulation data produced and analyzed.
- Use of regression, study of statistical correlations to answer field-specific questions.
- Worked on some projects independently and on others leading graduate students.

Graduate Researcher, Theoretical Physics

University of British Columbia

09/2011 – 08/2016 — Vancouver, BC, Canada

- Research focused on string theory and quantum information, with results presented in four peer-reviewed publications.
- Numerical work included linear algebra calculations and regression with Python, visualizations of results.
- Worked in collaboration with other graduate students under the supervision of senior scientists.

Teaching Assistant and TA Training Coordinator

University of British Columbia

09/2011 – 05/2016 — Vancouver, BC, Canada

- As a TA, led tutorial and lab sections with audiences ranging from large first-year general requirement classes to small graduate groups.
- Part of a 4-person team which developed and implemented a training program for approx. 30 new TAs per year.
- Managed a team of mentors and took part in delivering an 8-hour workshop.
- Helped design and analyze surveys to assess and revise elements of the training program and justify continued funding of over $40 000/year.

RECENT PERSONAL PROJECTS

Analysis of postdoc application success in high-energy physics

- Used self-reported identity and outcomes of applicants to build profiles based on analysis of publication records obtained online.
- Applicants separated into PhD students and postdocs by an XGBoost classifier with 90.6% accuracy on test set.
- Data accessed through web API calls and a custom-built mySQL database (run on AWS, approx. 600 MB), cleaned and processed in Python.
- Visualization of data with plotly: `psabellagarnier.github.io/postdoc_results`

Cryptanalysis of simple substitution ciphers

- Breaking classical substitution ciphers to experiment with various ML techniques and coding practices:
  - Genetic algorithm. Fitness of keys defined by frequency analysis evaluated by either a fully-connected neural network or classical statistics
  - Direct translation by 1D CNN and encoder-decoder model using LSTM units.
- Implementation in Python with Keras.

SKILLS

Technical tools

Python · Scikit-learn · Keras · Pandas · Plotly · Matplotlib · mySQL · Git · Mathematica · Matlab · LaTeX

Concepts

Neural Networks (incl. CNN, RNN) · Linear and Logistic Regression · SVM · Decision trees · Ensemble methods · Clustering · PCA

EDUCATION

Deep Learning Specialization

deeplearning.ai on Coursera

2020

Ph.D in Physics

University of British Columbia

Thesis:
"Geometry from quantum mechanics"

2011 – 2016 — Vancouver, BC, Canada

B.Sc. in Mathematics and Physics

McGill University

First Class Honours, with Distinction

2008 – 2011 — Montréal, QC, Canada

AWARDS

NSERC Postdoctoral Fellowship

National, based on research ability as well as communication and interpersonal skills. $45k/year

2018–2020

FRQNT Doctoral Scholarship

Provincial, based on academic excellence, research potential and communication skills. $20k/year

2013–2016

UBC 3-Minute Thesis Semi-Finalist

Competition to present doctoral thesis in under three minutes to a non-specialist audience

2016