Henry Kvinge

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EDUCATION

University of California, Davis (expected June 2017) GPA: 4.00
PhD, Mathematics,
Advisor: Monica Vazirani.

University of Washington, Seattle (March 2010) GPA: 3.90
BS, Mathematics,
BA, Biochemistry,
Magna Cum Laude

TECHNICAL SKILLS

Languages: Python (`NumPy, SciPy, Pandas, Scikit-learn`), R, C++, Matlab, LaTeX.

RESEARCH EXPERIENCES

Doctoral Researcher, UC Davis (2011-2017)

Subject: Representation theory, the study of mathematical symmetry.

- Identified and exploited patterns in combinatorial data to improve understanding of symmetries arising in quantum field theory.
- Independently completed two long-term research projects resulting in papers:
  - showed that a graphical calculus related to the Heisenberg algebra can be modeled by a family of well-known polynomials from probability theory,
  - demonstrated how symmetries in quiver Hecke algebras can be understood via a special family of colored directed graphs.
- Learned new subjects quickly and independently on a need-to-know basis.

PROJECTS

- **Predicting physician triage decisions using machine learning,** (capstone project for Institute for Mathematics and its Applications, Math-to-Industry Bootcamp, 2016)
  - Built a predictive algorithm in Python for Revon Systems, Inc. under mentorship of Revon chief data scientist Dr. Sumanth Swaminathan.
  - Algorithm predicts the physician triage decision for patients suffering from chronic asthma based on their current conditions.

- **Volunteer data scientist for "Investigation of the effects of solar radiation and pollution on crop yield"** (UC Davis Data Science Initiative, 2017)
  - Collected data on solar radiation, crop yield, and air pollution from online databases.
  - Performed exploratory data analysis in R and Python and presented results to team.

- **Khovanov's Heisenberg category and shifted symmetric functions** (2016)
  - Used diagrammatic techniques to show that a recently discovered algebra from physics is the "same" algebraically as a well-known collection of polynomials.
  - Successfully carried out a remote collaboration with researchers in Australia.

- **Crystal graphs and categorified quantum groups** (2015)
  - Demonstrated how a particular family of functors can relate the symmetries of quiver Hecke algebras (categorified quantum groups) to the crystal graphs $B^{1,1}$.
  - Developed an algorithm to decompose these symmetries into simpler components.

PUBLICATIONS AND PREPRINTS

- *Khovanov's Heisenberg category, moments in free probability, and shifted symmetric functions* (with Anthony Licata, Stuart Mitchell), arXiv:1610.04571 (2016).
- *Categorifying the tensor product of the Kirillov-Reshetikhin crystal $B^{1,1}$ and a fundamental crystal* (with Monica Vazirani), arXiv:1508.04182 (2015).

  Extended abstract in Proceedings of the 28th International Conference on Formal Power Series and Algebraic Combinatorics, Discrete Math. Theor. Comput. Sci. Proc. (2016), pp. 719-730.

OTHER EXPERIENCES

Commercial fisherman, Bristol Bay Alaska (1999-2015): Worked as a deckhand on the commercial salmon f/v *Anny Joy* for 6 weeks each summer in Bristol Bay, AK.
Associate Instructor, UC Davis (2015-2016): Prepared and delivered lectures, wrote and graded exams, and assigned grades for 50 student courses "Calculus for Biology and Medicine" and "Combinatorics".
Manager, UC Davis Calculus Rooms (2012 - 2014): Organized staffing of ∼30 teaching assistants.
Assistant Language Teacher, Izuhara High School (2010-2011): Created and implemented lesson plans for English language courses at Izuhara High School on the island of Tsushima, Japan.

Volunteer

Data scraper (Feb. 2, 2017): UC Davis ClimateRefuge/DataRescue event.
Graduate mentor (2013 - 2016): Women in Science and Engineering (WISE) Mentoring Program.
Volunteer math tutor (2011- 2016): STEM Café, a tutoring center that serves women and other underrepresented groups in math.

GRANTS AND FELLOWSHIPS

- Travel grant to present poster at Formal Power Series and Algebraic Combinatorics (FPSAC) Conference (2016)
- AMS Travel Grant to speak at AMS Fall Sectional at Loyola University (2015)
- Graduate Assistance in Areas of National Need Fellowship (summer 2013)
- NSF VIGRE Fellowship (summer 2012)