Christopher Shallue

Senior Research Software Engineer at Google Brain
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EMPLOYMENT

Senior Research Software Engineer, Google Brain — March 2016 – Present
Software Engineer, Google Display Ads — January 2014 – March 2016

EDUCATION

Monash University — **Clayton, Australia**
B.S. Mathematics (Honors) — March 2009 – June 2012
Undergraduate GPA: 4.0. Honors GPA: 4.0.

RESEARCH EXPERIENCE

Google Brain — March 2016 – present
Senior Research Software Engineer
Google Brain (https://g.co/brain) is a world-leading research department in machine learning and its applications in other fields of science. Team members work full-time on their own research agenda and publish their work in peer-reviewed journals and conferences.

Monash University — July 2011 – June 2012
Mathematics Honors Student
Honors Thesis: "Permutation Polynomials of Finite Fields." Available at: https://arxiv.org/abs/1211.6044.

RESEARCH INTERESTS

- Searching for terrestrial planets and measuring their occurrence rates.
- Developing and using new machine learning techniques in astronomy.
- Investigating fundamental questions about machine learning with robust experiments.

PUBLICATIONS

Refereed / under review (3 first author, 1 second author, 1 third author)
Citations to refereed publications: 55 (51 first author)

- **Shallue, C. J.** and Vanderburg, A. "Identifying Exoplanets with Deep Learning: A Five Planet Resonant Chain around Kepler-80 and an Eighth Planet around Kepler-90." *The Astronomical Journal*, 155, 94 (2018).
- Dattilo, A., Vanderburg, A., **Shallue, C. J.**, et al. "Identifying Exoplanets with Deep Learning II: Two New Super-Earths Uncovered by a Neural Network in K2 Data." *Under review* (2018).
- **Shallue, C. J.** et al. "Measuring the Effects of Data Parallelism on Neural Network Training." *Under review* (2018). Preprint: https://arxiv.org/abs/1811.03600.
- Dhingra, B., **Shallue, C. J.**, et al. "Embedding Text in Hyperbolic Spaces." *Twelfth Workshop on Graph-Based Methods for Natural Language Processing*, 59 (2018).
- **Shallue, C. J.** and Wanless, I. M. "Permutation Polynomials and Orthomorphism Polynomials of Degree Six." *Finite Fields and Their Applications*, 20, 84 (2013).

Non-refereed (1 first author)

- **Shallue, C. J.** "Permutation Polynomials of Finite Fields". *Honors Thesis.* Available at: https://arxiv.org/abs/1211.6044.

AWARDS

- 2012 Monash University Medal for Undergraduate Excellence (*top science student*)
- 2012 Carl Moppert Prize for Mathematics (*top mathematics honors student*)
- 2012 Australian Postgraduate Award (*research scholarship*)
- 2011 Monash University Jubilee Honors Scholarship
- 2010 Highest Academic Performance in a Science Course at Monash University (*6 time recipient*)
- 2010 Monash University Dean's List Fellowship Award
- 2009 Monash University Scholarship for Excellence
- 2008 Australian Student Prize (*awarded to top 500 students nationwide*)
- 2008 Premier's VCE Award (*awarded to top students statewide*)

TALKS / PRESENTATIONS

Invited

- "Using Deep Learning to Search for Earths in Kepler and K2 data." UCSC Planetary Lunch Talk, Nov. 26, 2018.
- "The Effects of Batch Size on Neural Network Training." NASA Frontier Development Lab, Jul. 23, 2018.
- "Hunting for Exoplanets with AI" (*part of Google's keynote*). World AI Conference, Shanghai, Sep. 18, 2018.
- "Hunting for Exoplanets with Machine Learning" (*keynote*). Chicago Booth ML Summit, Apr. 12, 2018.
- "Big Astronomy Begins: Searching for Exoplanets with AI." SETITalks, Feb. 21, 2018.
- "Deep Learning for Planet Transits." NASA Frontier Development Lab, Jul. 20, 2017.

Contributed

- "Classifying Kepler Light Curves Using Deep Learning." Bay Area Exoplanet Meeting at NASA, Dec. 1, 2017.
- "Discovering New Planets with Machine Learning." Research at Google Conference, Nov. 15, 2017.

SERVICE

Professional Service

- Referee for the *Astronomical Journal* (2018).

Outreach

- Presented on astronomy and machine learning for Science Week at Brighton High School (2018).
- Led a TensorFlow workshop at Women Techmakers (2017).
- Hosted a Reddit AMA in the NASA Science series (2017).
- Presented on the Google AI Residency Program at the University of Toronto (2016).

Blog posts (*each post reached over one million subscribers*)

- "Open Sourcing the Hunt for Exoplanets." Google AI Blog, Mar. 8, 2018.
- "Earth to Exoplanet: Hunting for Planets with Machine Learning." Google Blog, Dec. 14, 2017.
- "Show and Tell: Image Captioning Open Sourced in TensorFlow." Google AI Blog, Sep. 22, 2016.

TEACHING AND ADVISING

Classroom Experience

- Six-time instructor for the two-day *Machine Learning Crash Course* at Google (2016–present).

- TA for *Mathematics For Computer Science* at Monash University (2013).
- TA for *Algebra and Number Theory* at Monash University (2012).
- TA for *Techniques For Modeling* at Monash University (2011).

Advising

- Alex Tamkin (Stanford University / Google research intern): manager and primary advisor (2018). Alex presented his work at the Bay Area Exoplanet Meeting at NASA Ames on Sep. 7, 2018.
- Bhuwan Dhingra (Carnegie Mellon University / Google research intern): secondary advisor (2017). Bhuwan published a paper at the *Workshop on Graph-Based Methods for Natural Language Processing* (2018).
- Primary advisor for 3 researchers in the Google AI residency program (2017–present). Role includes research guidance, mentoring and pair-programming. One paper is currently under review and another is in preparation.

MEDIA

Press Releases

- "Artificial Intelligence, NASA Data Used to Discover Eighth Planet Circling Distant Star." Joint release by NASA, Google, and the University of Texas. Audience of 44 journalists and 300,000 listeners. Dec. 14, 2017.

TV / Podcast / Radio

- "Hunting for Planets with Machine Learning." Televised interview for Cosmic Front on NHK (Japan's largest broadcasting organization). Aired Sep. 13, 2018.
- "Detecting Planets with Deep Learning." Practical AI podcast. Aired Jul. 16, 2018.
- "Discovering Exoplanets with Deep Learning." This Week in Machine Learning & AI. Aired Mar. 8, 2018.
- "Discovering Planets with Machine Learning." ABC Radio interview (Australian national broadcaster). Aired Dec. 15, 2018.

Press Coverage

- "Google AI Helped Find the First Solar System Outside Our Own with 8 Planets." Dec. 14, 2017.
  Featured in outlets including the New York Times, Washington Post, CNN, National Geographic, BBC, Wired, Popular Science, and UT Austin's "Research that Changed the World in 2017." Follow up interviews and coverage in Korea (Jan., 2018), Taiwan (Feb., 2018), Japan (Aug., 2018), and China (Sep., 2018).
- "Google Open Sources Image Captioning Model in TensorFlow." Sep. 22, 2016.
  Featured in outlets including TechCrunch, Engadget, Venture Beat, and Gizmodo.

OPEN SOURCE CODE

- Exoplanet ML: Machine learning models and utilities for exoplanet science.
  `https://github.com/google-research/exoplanet-ml`
- Skip-Thought Vectors: A neural network for learning unsupervised sentence embeddings.
  `https://git.io/fp1Ho`
- Show and Tell: A neural image caption generator.
  `https://git.io/fp1HX`

Last updated December 12, 2018