Center for Language and Speech Processing
Johns Hopkins University
Baltimore, MD

Phone: (469) 834-3984
arya@jhu.edu
cs.jhu.edu/~arya

Arya D. McCarthy

Research Focus

I work on **morphology** as a tool for **Machine Translation**. The effort is part of the DARPA Low Resource Languages for Emergent Incidents (LORELEI) project, which focuses on **rapid development** of NLP tools for languages with little or no training data. This includes building a **massively multilingual** annotated lexicon for the Universal Morphology (UniMorph) project, as well as developing **adaptation** methods for existing translation models.

Recently, I have also worked on deep, neural models of sensory perception in PyTorch.

I also remain active in the **network science** community, where I specialize in **community detection**.

Education

Johns Hopkins University
2017 – Present. Ph.D. in Computer Science
Advisor: David Yarowsky

Southern Methodist University
2017. M.S. in Computer Science
Thesis: *The Leximin Method for Hierarchical Community Detection*
Advisor: David W. Matula
2017. B.S. in Computer Science, Mathematics
Magna Cum Laude; Honors in the Liberal Arts, University Honors Program

Single terms of study at the University of Edinburgh (2015) and Stanford University (2014)

Employment

Human Language Technology Center of Excellence, Baltimore, MD
Summer 2018. Participant, Summer Camp for Applied Language Exploration (SCALE)
Supervisor: Kevin Duh
Area: Domain adaptation for machine translation

Darwin Deason Institute for Cyber Security, Dallas, TX
2015 – 2016. Research Assistant
Supervisor: Mitch Thornton

Grants and Awards

2017 Dean's Award: Best CSE poster at SMU Research Day 2017. *AirWare: In-air gesture recognition using ultrasonic Doppler signatures and deep neural networks*
Charles J. Pipes Award for Outstanding Performance in Mathematics

2016 Robert Mayer Interdisciplinary Fellowship
Hamilton Undergraduate Research Fellowship
Robert S. Hyer Society. Highest academic honor at SMU.

2015 Harvard–Amgen Scholarship; host Stuart Shieber
Upsilon Pi Epsilon

2014 Tau Beta Pi

2013 President's Scholarship. Highest merit scholarship at SMU. One of 21 in class of 2017.

Campus Community Award: Full room and board for 4 years, awarded for leadership on campus.

Publications

Refereed Journal Papers

1. **Arya D. McCarthy** and Ryan Cotterell. *A deep, latent-variable model for languages' color inventories*. TACL. *(Under review)*

Refereed Conference Submissions

2. **Arya D. McCarthy**. *An exact No Free Lunch theorem for clustering and community detection*. Complex Networks (ICCNA) 2018. *(To appear)*
3. **Arya D. McCarthy** and David W. Matula. *Evaluating the leximin method for community detection*. Complex Networks (ICCNA) 2018. *(To appear)*
4. Brian Thompson, Huda Khayrallah, Antonios Anastasopoulos, **Arya D. McCarthy**, Kevin Duh, Rebecca Marvin, Paul McNamee, Jeremy Gwinnup, Tim Anderson and Philipp Koehn. *Freezing subnetworks to analyze domain adaptation in neural machine translation*. Proceedings of WMT 2018.
5. Christo Kirov, Ryan Cotterell, John Sylak-Glassman, Géraldine Walther, Ekaterina Vylomova, Patrick Xia, Manaal Faruqui, **Arya D. McCarthy**, Sandra Kübler, David Yarowsky, Jason Eisner, and Mans Hulden. *UniMorph 2.0: Universal morphology*. Proceedings of LREC 2018.

Refereed Workshop Proceedings

6. **Arya D. McCarthy**, Miikka Silfverberg, Ryan Cotterell, Mans Hulden, and David Yarowsky. *Marrying Universal Dependencies and Universal Morphology*. Proceedings of EMNLP UDW 2018.
7. **Arya D. McCarthy** and David W. Matula. *Normalized mutual information exaggerates community detection performance*. SIAM Workshop on Network Science 2018.

Invited Publications

8. Ryan Cotterell, Christo Kirov, John Sylak-Glassman, Géraldine Walther, Ekaterina Vylomova, **Arya D. McCarthy**, Katharina Kann, Sebastian Mielke, Garrett Nicolai, Miikka Silfverberg, David Yarowsky, Jason Eisner, and Mans Hulden. *The CoNLL–SIGMORPHON 2018 shared task: Universal morphological reinflection*. Proceedings of CoNLL–SIGMORPHON 2018.

Non-Public Technical Reports

9. **Arya D. McCarthy**. *Design and Implementation of a Method of Abstractly Simulating Cyber Security Vulnerabilities: Embedded Markov and Discrete Event Simulation Approaches.* Deason Institute for Cyber Security 2016.

Teaching

2018 Teaching Assistant, Natural Language Processing, Jason Eisner, JHU, Fall.
Teaching Assistant, Doing Data Science, Faizan Javed, SMU MSDS, Spr, Sum, Fall.

2017 Grader, Quantifying the World, Owen Martin & John Verostek, SMU MSDS, Fall.
Guest Instructor, Fundamentals of Algorithms, Vidroja Debroy, Spring.

2015 Teaching Assistant, Fundamentals of Algorithms, Tyler Moore, Spring.

Invited Talks

1. Coming Together, Mathematically: Dynamical Models for Increased Uniformity and Polarization in American Politics. May 2017
   Location: Southern Methodist University (Hamilton Fellows Series)
2. Toward Fast, Accurate Simulation of Gap Junctions in NNs. March 2017
   Location: Southern Methodist University (as Summer Research Fellow)

Service

Shared task organizer: CoNLL–SIGMORPHON 2018 (Universal Morphological Reinflection)

Program committee: SIGMORPHON, WMT

Reviewer for: WMT (2018), SIGMORPHON (2018), EMNLP (2018 secondary)

Open-source contributions: `networkx`, `scikit-learn`, `PyTorch/tutorials`

Judge for ACM-ICPC contest at JHU (2017, 2018)

Diversity and Inclusion committee for Department of Computer Science (2017 –)

Extracurricular Activities

Graduate president of Ballroom Dance @ JHU

Bagpiper