Braden Hancock

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RESEARCH INTERESTS

Weakly supervised machine learning, rapid training data generation, information extraction, program synthesis, non-traditional supervision, learning from natural language, knowledge base construction, semantic parsing, natural language processing, neural networks, multi-objective optimization

EDUCATION

Stanford University

Ph.D. Computer Science (Jun. 2020)
Advisors: Chris Ré, Percy Liang
Machine Learning Emphasis (GPA 4.00)

Brigham Young University

BS Mechanical Engineering, Mathematics Minor (Apr. 2015)
Advisor: Chris Mattson
Valedictorian, *summa cum laude* (GPA 4.00)
Honors Distinction and Thesis

EXPERIENCE

Stanford University

Stanford InfoLab, Stanford NLP Group, 2016–Present

- Designed weak supervision solutions for generating training data, learning from natural language, and information extraction from semi-structured data. Code base in use by collaborators such as Alibaba, DARPA, and Stanford Medicine (see https://github.com/HazyResearch/snorkel).

Google

Google Brain & Google Search, Summer 2017

- Developed recursive neural network model and crowdsourced training data for abstractive summarization of semi-structured web content.

MIT Lincoln Laboratory

Computing and Analytics Group, Summers 2014–2015

- Led 25-person internal study committee in compiling report on the state of the art of recommender systems for Department of Defense applications.

Johns Hopkins University

Human Language Technology Center of Excellence, Summer 2013

- Extracted public health trends from 40 million text documents retrieved from Twitter and online news organizations.

Brigham Young University

Design Exploration Research Group, 2011–2015

- Developed novel multi-objective optimization algorithms (evolutionary and gradient-based methods) for smart Pareto frontier exploration. Results published in two peer-reviewed journal articles as first author and defended as undergraduate Honors thesis.

Air Force Research Laboratory

Turbine Engine Division, Summer 2011

- Designed algorithms for reducing shock wave reflection in turbine engine airfoils. Results awarded first place in international undergraduate research competition.

AWARDS AND HONORS

National Science Foundation Graduate Research Fellowship (NSF GRF)

2015, National Science Foundation

National Defense Science and Engineering Graduate Fellowship (NDSEG)

2015, Department of Defense (declined to accept NSF)

Phi Kappa Phi Marcus L. Urann Fellowship

2015, Phi Kappa Phi, 1 of 6 awarded per year

Finch Family Fellowship (Stanford)

2015, Stanford University, School of Engineering

AIAA Vicki and George Muellner Scholarship

2014, AIAA, 1 awarded per year

AIAA Orville and Wilbur Wright Scholarship

2013, AIAA, 1 of 3 awarded per year

Barry M. Goldwater Scholarship

2013, Barry M. Goldwater Scholarship Foundation

ASME Kenneth Andrew Roe Scholarship

2012, ASME, 1 awarded per year

National Merit Scholarship

2011, National Merit Scholarship Association

Thomas S. Monson Presidential Scholarship (BYU)

2011, Brigham Young University, awarded to less than 1% of students (150% tuition x 4 years)

PUBLICATIONS

[All published articles can be found on my Google Scholar profile]

Journal Papers

V. Gadepally, B. Hancock, K. Greenfield, J. Campbell, W. Campbell, A. Reuther, "Recommender Systems for the Department of Defense and Intelligence Community," *The Lincoln Laboratory Journal* 22.1 (Jul. 2016): 74-89.

B. Hancock, T. Nysetvold, C. Mattson, "L-Dominance: An Approximate Domination Mechanism for Adaptive Resolution of Pareto Frontiers," *Structural and Multidisciplinary Optimization* 52.2 (Apr. 2015): 269-279.

B. Hancock, J. Clark, "Reducing Shock Interactions in Transonic Turbine via Three-Dimensional Aerodynamic Shaping," *AIAA Journal of Propulsion and Power* 30.5 (Oct. 2014): 1248-1256.

B. Hancock, C. Mattson, "The Smart Normal Constraint Method for Directly Generating a Smart Pareto Set," *Structural and Multidisciplinary Optimization* 48.4 (Oct. 2013): 763-775.

S. Curtis, B. Hancock, C. Mattson, "Usage Scenarios for Design Space Exploration with a Dynamic Multiobjective Optimization Formulation," *Research in Engineering Design* 24.4 (Oct. 2013): 395-409.

S. Curtis, C. Mattson, B. Hancock, P. Lewis, "Divergent Exploration in Design with a Dynamic Multiobjective Optimization Formulation," *Structural and Multidisciplinary Optimization* 47.5 (May 2013): 645-657.

Conference Papers

B. Hancock, P. Varma, C. Ré, "Babble Labble: Training Label Generation from Natural Language Explanations" (In progress).

B. Hancock, H. Lee, C. Yu, Q. Le, “Automatic Structured Data Title Generation with Pointer-Generator Networks” (In progress).

S. Wu, L. Hsiao, X. Cheng, B. Hancock, T. Rekatsinas, P. Levis, C. Ré, “Fonduer: Knowledge Base Construction from Richly Formatted Data,” arXiv preprint arXiv:1703.05028, Mar. 2017.

V. Kuleshov, J. Ding, B. Hancock, A. Ratner, C. Ré, S. Batzoglou, M. Snyder, “A Machine-Compiled Database of Genome-Wide Association Studies,” Bio-Ontologies 2017, July 2017.

A. Benton, B. Hancock, G. Coppersmith, J. Ayers, M. Dredze, “After Sandy Hook Elementary: A Year in the Gun Control Debate on Twitter,” Data for Good Exchange 2016, Sep. 2016.

A. Benton, M. Paul, B. Hancock, M. Dredze. “Collective Supervision of Topic Models for Predicting Surveys with Social Media,” Proceedings of the Conference of the Association for the Advancement of Artificial Intelligence (AAAI), Feb. 2016.

J. Kepner, V. Gadepally, B. Hancock, P. Michaleas, E. Michel, M. Varia, “Parallel Vectorized Algebraic AES in MATLAB for Rapid Prototyping of Encrypted Sensor Processing Algorithms and Database Analytics,” 2015 IEEE High Performance Extreme Computing Conference, Sep. 2015.

V. Gadepally, B. Hancock, B. Kaiser, J. Kepner, P. Michaleas, M. Varia, A. Yerukhimovich, “Computing on Masked Data to Improve the Security of Big Data,” 2015 IEEE International Conference on Technologies for Homeland Security, Apr. 2015.

B. Hancock, T. Nysetvold, C. Mattson, “L-Dominance: A New Mechanism Combining Epsilon-Dominance and Pareto Knee Exploitation in Evolutionary Multiobjective Optimization,” AIAA 53rd Aerospace Sciences Meeting, Jan. 2015.

***Best Student Paper Award**

B. Hancock, T. Nysetvold, C. Mattson, “L-Dominance: An Approximate-Domination Mechanism for Adaptive Resolution of Pareto Frontiers,” 15th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, Jun. 2014.

URL: http://arc.aiaa.org/doi/abs/10.2514/6.2014-2179

B. Hancock, C. Mattson, “The Smart Normal Constraint Method for Directly Generating a Smart Pareto Set,” 9th AIAA Multidisciplinary Design Optimization Specialist Conference, Apr. 2013.

B. Hancock, J. Clark, “Reducing Shock Interactions in a High Pressure Turbine via 3D Aerodynamic Shaping,” 51st AIAA Aerospace Sciences Meeting, Jan. 2013.

***Best Student Paper Award**

S. Curtis, B. Hancock, C. Mattson, “Use Scenarios for Design Space Exploration with a Dynamic Multiobjective Optimization Formulation,” ASME 2012 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, Aug. 2012.

***Best Paper Award**

S. Curtis, C. Mattson, B. Hancock, P. Lewis, “Divergent Exploration in Design with a Dynamic Multiobjective Optimization Formulation,” 8th AIAA Multidisciplinary Design Optimization Specialist Conference, Apr. 2012.

Invited Talks

Graduation Speech, “What Every Graduate Would Say,” Ira A. Fulton College of Engineering Convocation, Apr. 24, 2015.

Posters

“Technologies for Visualization of Big Medical Data,” 41st International Conference on Very Large Databases (VLDB), Sept. 2015.

“Domain Adaptation of a Statistical Classifier Using Topic Models,” Johns Hopkins University NSF-REU Poster Session, Aug. 2013.

***Best Poster Award**