

# Braden Hancock

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## RESEARCH INTERESTS

Machine learning systems, weak supervision, multi-task learning, training data creation, learning from natural language, information extraction, natural language processing, knowledge integration

## EDUCATION

### Stanford University

Ph.D. Computer Science (Jun. 2020)  
Advisor: Christopher Ré  
Machine Learning Emphasis (GPA 4.00)

### Brigham Young University

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

## EXPERIENCE

### Stanford University

Stanford InfoLab, Stanford NLP Group, 2016–Present

- Developed weak supervision solutions for generating training data, supervising multi-task learning, learning from natural language, and extracting information from semi-structured data. Research results were published in top systems, machine learning, and NLP venues and are in use by collaborators such as Alibaba, DARPA, and Stanford Medicine.

### 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 for incompatibility with NSF)

### **Phi Kappa Phi Marcus L. Urann Fellowship**

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

### **Stanford School of Engineering Finch Family Fellowship**

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: <https://goo.gl/5U3dLA> ]

### **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, S. Wang, M. Bringmann, P. Liang, C. Ré, "Training Classifiers with Natural Language Explanations," ACL 2018 (long talk).

- S. Wu, L. Hsiao, X. Cheng, B. Hancock, T. Rekatsinas, P. Levis, C. Ré, "Fonduer: Knowledge Base Construction from Richly Formatted Data," SIGMOD 2018 (long talk).
- V. Kuleshov, J. Ding, B. Hancock, A. Ratner, C. Ré, S. Batzoglu, 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 53<sup>rd</sup> 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.
- 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.

**Demonstrations**

- B. Hancock, S. Wang, P. Varma, P. Liang, C. Ré, "Learning from Natural Language Explanations with Babble Labble", Demonstration, 2017 Neural Information Processing Systems (NIPS), Dec. 2017.

**Workshop Papers**

- A. Ratner, B. Hancock, J. Dunnmon, R. Goldman, C. Ré, "Snorkel MeTaL: Weak Supervision for Multi-task Learning," DEEM Workshop 2018 (long talk).

**Preprints**

- B. Hancock, H. Lee, C. Yu, "Title Generation for Web Tables," arXiv preprint, Jul. 2018.

**Invited Talks**

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

SERVICE

**Journal Reviewer**

Structural and Multidisciplinary Optimization (Spring)

**Program Committee**

NIPS 2017 Workshop “Learning from Limited Data: Weak Supervision and Beyond”