

## Hussein Hazimeh

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INTERESTS	Optimization, Data Science, Business Analytics	
EDUCATION	<b>Massachusetts Institute of Technology</b> , Cambridge, MA	2016-2021
	<i>PhD Candidate</i> in Operations Research	
	Thesis Title: Interpretable Machine Learning at Scale: Methods and Applications	
	Advisor: Rahul Mazumder	
	<b>University of Illinois at Urbana-Champaign</b> , Urbana, IL	2014-2016
	<i>MS</i> in Computer Science	
	Thesis Title: Axiomatic Analysis of Pseudo-Relevance Feedback Algorithms	
	Advisor: ChengXiang Zhai	
	<b>American University of Beirut</b> , Beirut, Lebanon	2010-2014
	<i>BE</i> with high distinction in Electrical and Computer Engineering	
SELECTED AWARDS	<b>Young Researchers Prize</b> , INFORMS Optimization Society. <a href="#">Link</a> .	2020
	“For an outstanding paper in optimization.”	
	<b>Best Student Paper Award</b> , MIT Operations Research Center	2020
	<b>Honorable Mention</b> , INFORMS Computing Society. <a href="#">Link</a> .	2020
	<b>Honorable Mention</b> , Mixed Integer Programming (MIP) Workshop. <a href="#">Link</a> .	2019
	<b>Distinguished Graduate Award</b> , American University of Beirut	2014
	“For outstanding academic achievement, character, and contribution.”	
PAPERS	<i>Published or under review.</i>	
	P1. “Fast Best Subset Selection: Coordinate Descent and Local Combinatorial Optimization Algorithms”. Hussein Hazimeh and Rahul Mazumder. <i>Operations Research</i> (2020). <a href="#">Link</a> .	
	★ Young Researchers Prize, INFORMS Optimization Society, 2020.	
	P2. “Sparse Regression at Scale: Branch-and-Bound rooted in First-Order Optimization”. Hussein Hazimeh, Rahul Mazumder, and Ali Saab. Under review in <i>Mathematical Programming</i> . <a href="#">Link</a> .	
	★ Best Student Paper Award, MIT Operations Research Center, 2020.	
	★ Honorable Mention, INFORMS Computing Society, 2020.	
	P3. “The Tree Ensemble Layer: Differentiability meets Conditional Computation”. Hussein Hazimeh, Natalia Ponomareva, Petros Mol, Zhenyu Tan, and Rahul Mazumder. <i>ICML</i> (2020). <a href="#">Link</a> .	
	P4. “Learning Hierarchical Interactions at Scale: A Convex Optimization Approach”. Hussein Hazimeh and Rahul Mazumder. <i>AISTATS</i> (2020). <a href="#">Link</a> .	
	P5. “Learning Sparse Classifiers: Continuous and Mixed Integer Optimization Perspectives”. Antoine Dedieu, Hussein Hazimeh, and Rahul Mazumder. <i>JMLR</i> (2020,	

accepted with a minor revision). [Link](#).

P6. “Axiomatic Analysis of Smoothing Methods in Language Models for Pseudo-relevance Feedback”. Hussein Hazimeh and ChenXiang Zhai. SIGIR ICTIR (2015). [Link](#).

*Working Papers.*

P7. “Sparse Regression with Interactions: A Scalable Integer Programming Approach”. Hussein Hazimeh and Rahul Mazumder.

★ Honorable Mention, Mixed Integer Programming (MIP) Workshop, 2019.

P8. “Grouped Variable Selection with Discrete Optimization”. Hussein Hazimeh, Rahul Mazumder, and Peter Radchenko.

P9. “Smooth Routing in Neural Networks”. Hussein Hazimeh, Zhe Zhao, James Chen, Mahesh Sathiamoorthy, and Aakanksha Chowdhery.

## INDUSTRY

**Liberty Mutual Insurance**, Boston, MA April 2020 - May 2021  
Research Assistant, as part of a collaboration with MIT  
Developed an interpretable, multi-task predictive model for insurance claims.

**Google Research**, Mountain View, CA June 2020 - Sep 2020  
Research Intern, Brain Team  
Hosts: Zhe Zhao, James Chen, Mahesh Sathiamoorthy, and Aakanksha Chowdhery.  
Designed a new computational model (based on conditional computation) that improves the computational efficiency and interpretability in neural networks.

**Google Research**, New York, NY May 2019 - Aug 2019  
Research Intern, Modeling and Data Science Team  
Hosts: Natalia Ponomareva, Petros Mol, and Zhenyu Tan.  
Developed a (differentiable) tree ensemble layer for neural networks, which supports conditional computation. [Link](#).

**Amazon**, Seattle, WA June 2016 - Aug 2016  
Research Intern, Core Machine Learning Team  
Host: Charles Elkan  
Reduced the latency of predictions in Apache Spark, allowing typical machine learning pipelines to be served in production within sub-millisecond latencies.

**Jump Trading**, Chicago, IL Oct 2015 - May 2016  
Research Assistant, as part of a collaboration with UIUC  
Mentors: ChengXiang Zhai, C.J. Shen, and Jeff Ludwig  
Developed text mining methods for utilizing Twitter news in high-frequency trading.

## OPEN-SOURCE SOFTWARE

I am a major developer in the following toolkits (written in C++, Python, and R)

**L0Learn**: Fast approximate algorithms for L0-regularized learning. 15,000+ downloads. [Link](#).

**TEL**: A tree ensemble layer for neural networks (compatible with TensorFlow). [Link](#).

**L0BnB**: A scalable branch-and-bound framework for L0-regularized learning. [Link](#).

**hierScale**: A scalable convex optimization algorithm for learning sparse pairwise interactions. [Link](#).



ACADEMIC  
SERVICE

Reviewer for *Journal of the American Statistical Association (JASA)*, *Journal of Machine Learning Research (JMLR)*, and *INFORMS Data Mining Section*.

RELEVANT  
COURSEWORK

Machine Learning - Statistical Learning Theory - Non-linear Programming - Convex Optimization - Integer Programming and Combinatorial Optimization - Fundamentals of Probability - Statistical Inference - Time Series Analysis - Algorithms - Information Retrieval - Data Mining - Machine Learning for Healthcare - Databases

COMPUTER  
SKILLS

**Languages:** C++ - Python - R - MATLAB - SQL

**Relevant Software:** TensorFlow - Optimization Solvers (Gurobi, MOSEK, CPLEX)

REFERENCES

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Sloan School of Management  
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