

Elias B. Khalil

CONTACT INFORMATION	Klaus Advanced Computing Building 266 Ferst Dr. NW Atlanta, GA 30332 USA	Phone: (404) 429 3015 E-mail: elias.khalil@cc.gatech.edu Webpage: www.ekhalil.com
RESEARCH AREAS	machine learning, integer programming, combinatorial optimization	
EDUCATION	Georgia Institute of Technology , Atlanta, Georgia, USA Ph.D. Candidate, Computational Science & Engineering Aug. 2014 – May 2019 (expected) <ul style="list-style-type: none">• Dissertation: <i>Towards Tighter Integration of Machine Learning & Discrete Optimization</i>• Committee: Bistra Dilkina (adviser), George Nemhauser, Shabbir Ahmed, Le Song, Tuomas Sandholm (Carnegie Mellon University)• Minor area: Operations Research (<i>School of Industrial & Systems Engineering</i>) M.S., Computer Science , G.P.A. 3.81 August 2012 – May 2014 <ul style="list-style-type: none">• Thesis: “Optimizing the Structure of Diffusion Networks: Theory and Algorithms”• Thesis Committee: Le Song, Bistra Dilkina, Duen Horng (Polo) Chau American University of Beirut (AUB) , Beirut, Lebanon B.S., Computer Science , G.P.A. 3.57 September 2009 – June 2012	
FELLOWSHIPS	<i>IBM Ph.D. Fellowship</i> 2017–2018 <i>Marshall D. Williamson Fellowship</i> (\$2,600), Georgia Institute of Technology 2014 <i>Donald V. Jackson Fellowship</i> (\$1,500), Georgia Institute of Technology 2013 <i>Association Philippe Jabre Fellowship</i> (\$5,000) to attend Georgia Tech 2012–2013	
PAPER/POSTER AWARDS	<i>First Prize, Poster Competition</i> , INFORMS Annual Meeting (top 1% of submissions) 2017 <i>Outstanding Poster Award</i> , NemFest Workshop in Celebration of Nemhauser and Nemirovski 2017 <i>Best Paper Award</i> , NIPS Workshop on Frontiers of Network Analysis 2013	
OTHER AWARDS	<i>Travel Award</i> (\$800), Neural Information Processing Systems (NIPS) 2017 <i>Travel Award</i> (\$1,000), International Joint Conference on Artificial Intelligence (IJCAI) 2016 <i>Travel Award</i> (\$125), AAAI Conference on Artificial Intelligence 2016 <i>Travel Award</i> (\$500), Mixed Integer Programming Workshop 2015 <i>Travel Award</i> (\$1,500), Georgia Tech Career, Research and Innovation Conference 2015, 2016 <i>Dean’s Honor List</i> , American University of Beirut 2009–2011	
PROFESSIONAL EXPERIENCE	Georgia Institute of Technology , Atlanta, Georgia USA <i>Graduate Research Assistant</i> August 2014 – Present IBM Research AI , Yorktown Heights, New York USA <i>Research Intern – Automated Machine Learning & Data Science</i> August 2017 – Dec. 2017 <ul style="list-style-type: none">– Discrete optimization methods for the architecture search problem in deep learning; working paper to be submitted to ICML 2018. IBM Research , Yorktown Heights, New York USA <i>Research Intern</i> May 2016 – July 2016 <ul style="list-style-type: none">– Worked with Dr. Udayan Khurana in the Exploratory Stream Analytics group managed by Dr. Deepak Turaga on machine learning and combinatorial search.	

- Designed an algorithm for feature engineering; patent filed.

Symantec Corporation, Culver City, California USA

Ph.D.-level Intern, Research Labs

May 2013 – August 2013

- Worked on the development of data mining techniques for solving critical security problems.
- Inventor on two granted patents (details below).

TEACHING
EXPERIENCE

Georgia Institute of Technology, Atlanta, Georgia USA

Graduate Teaching Assistant

- Course: Computational Science & Engineering Algorithms (CSE 6140)
 - Fall 2018: Prof. Umit Catalyurek, 160 students
 - Fall 2014: Prof. Bistra Dilkina, 90 students
- Gave multiple full lectures; Assisted students; Graded and designed assignments and a project

PUBLICATIONS
(* CO-FIRST
AUTHORS)

Elias Khalil, Amrita Gupta, Bistra Dilkina. (2018). Combinatorial Attacks on Binarized Neural Networks. [arXiv:1810.03538 \[cs.LG\]](#). In submission to ICLR 2019.

Hanjun Dai*, **Elias Khalil***, Yuyu Zhang, Bistra Dilkina, Le Song. (2017). Learning Combinatorial Optimization Algorithms over Graphs. Neural Information Processing Systems (NIPS). **Spotlight presentation, top 5% of submissions**

Elias Khalil, Bistra Dilkina, George Nemhauser, Shabbir Ahmed, Yufen Shao. (2017). Learning to Run Heuristics in Tree Search. Proceedings of the 26th International Joint Conference on Artificial Intelligence (IJCAI).

Fatemeh Nargesian, Udayan Khurana, Horst Samulowitz, **Elias Khalil**, Deepak Turaga. (2017). Learning Feature Engineering for Classification. Proceedings of the 26th International Joint Conference on Artificial Intelligence (IJCAI).

Mehrdad Farajtabar, Jiachen Yang, Xiaojing Ye, Huan Xu, Rakshit Trivedi, **Elias Khalil**, Shuang Li, Le Song, Hongyuan Zha. (2017) Fake News Mitigation via Point Process Based Intervention. International Conference on Machine Learning (ICML).

Elias Khalil. (2016). Machine Learning for Integer Programming. Proceedings of the Doctoral Consortium at the Twenty-Fifth International Joint Conference on Artificial Intelligence (IJCAI).

Elias Khalil, Pierre Le Bodic, Le Song, George Nemhauser, Bistra Dilkina. (2016). Learning to Branch in Mixed Integer Programming. 30th AAAI Conference on Artificial Intelligence (AAAI).

Sucheta Soundarajan, Acar Tamersoy, **Elias Khalil**, Tina Eliassi-Rad, Duen Horng Chau, Brian Gallagher, Kevin Roundy. (2016). Generating Graph Snapshots from Streaming Edge Data (poster paper). 25th International World Wide Web Conference (WWW).

Elias Khalil, Bistra Dilkina, Le Song. (2014). Scalable Diffusion-Aware Optimization of Network Topology. 20th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD).

Acar Tamersoy, **Elias Khalil**, Bo Xie, Stephen Lenkey, Brian Routledge, Duen Horng Chau, Shamkant Navathe. (2014). Large-scale insider trading analysis: patterns and discoveries. Social Network Analysis and Mining (SNAM), 4(1), pp. 1–17.

Elias Khalil, Bistra Dilkina, Le Song. (2013). CUTTINGEDGE: Influence minimization in networks. Workshop on Frontiers of Network Analysis: Methods, Models, and Applications at Advances in Neural Information Processing Systems (NIPS). **Best Paper award**

INVITED TALKS

CPAIOR 2018 Master Class on “Learning Combinatorial Optimization Algorithms over Graphs” – Delft, The Netherlands **2018**

PRESENTATIONS	INFORMS 2018 Annual Meeting (2 invited talks) (INFORMS 2018)	2018
	International Symposium on Mathematical Programming (invited talk) (ISMP 2018)	2018
	NIPS 2017 (spotlight talk) (Travel award) (NIPS 2017)	2017
	INFORMS 2017 Annual Meeting (2 invited talks) (INFORMS 2017)	2017
	INFORMS 2016 Annual Meeting (invited talk) (INFORMS 2016)	2016
	INFORMS Optimization Society Conference (talk) (IOS 2016)	2016
	Thirtieth AAAI Conference on Artificial Intelligence (talk) (Travel award) (AAAI 2016)	2016
	International Symposium on Mathematical Programming (invited talk) (ISMP 2015)	2015
	Mixed Integer Programming Workshop (poster) (Travel award)	2015
	Hot Topics in Computational Science & Engineering, Georgia Tech (talk)	2015, 2016
	Georgia Tech Research and Innovation Conference (poster) (Best Poster award)	2015
	ACM Conference on Knowledge Discovery and Data Mining (KDD) (talk & poster)	2014
	Workshop on Frontiers of Network Analysis at NIPS 2013 (poster) (Best Paper award)	2013
	PATENTS GRANTED	<i>Systems and Methods for Adjusting Suspiciousness Scores in Event-Correlation Graphs</i> (while at Symantec), US9148441 B1, Filed in 2013, Granted in 2015
<i>Systems and Methods for Using Event-Correlation Graphs to Detect Attacks on Computing Systems</i> , US9141790 B2, (while at Symantec), Filed in 2013, Granted in 2015		
ACADEMIC SERVICE	Conference Reviewer: ICLR 2019, AISTATS 2019, AAAI '15-'18, NIPS '17-18, ICML '18, CP '16, LION '16, IJCAI '16, KDD '15-'16	
	Journal Reviewer: JMLR, IEEE TKDE, Operations Research, INFORMS Journal of Computing, INFORMS Journal of Optimization, Annals of Operations Research, Computers & Operations Research, Algorithmica	
LANGUAGES	Fluent in Arabic (native), English and French	