

Rafid Mahmood

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Education

University of Toronto, Mechanical and Industrial Engineering

Ph.D Industrial Engineering (Operations Research) 2015–2020
Vector Institute for Artificial Intelligence Postgraduate Affiliate 2019–2020
Adviser: Professor Timothy C. Y. Chan
Thesis: Learning to Solve Optimization Problems with Hidden Components

University of Toronto, Electrical and Computer Engineering

M.A.Sc. Electrical Engineering 2013–2015
Adviser: Professor Ashish Khisti
Thesis: Rank Metric Convolution Codes with Applications in Network Streaming
Honors B.A.Sc. Electrical Engineering 2008–2013

Publications¹

Under Review

1. T. C. Y. Chan, A. Diamant, and **R. Mahmood***, Sampling from the Complement of a Polyhedron: An MCMC Algorithm for Data Augmentation, *under review at Operations Research Letters*, 2020.
2. A. Babier, T. C. Y. Chan, A. Diamant, and **R. Mahmood***, Learning to Optimize with Hidden Constraints, *under review at Operations Research*, 2019.
3. A. Babier, T. C. Y. Chan, T. Lee, **R. Mahmood***, and D. Terekhov, An Ensemble Learning Framework for Model Fitting and Evaluation in Inverse Linear Optimization, *under review at INFORMS Journal on Optimization*, 2019.
 - **Honorable Mention at CORS 2018 Best Student Paper Competition: Open Category.**
 - Preliminary version at the 2019 Canadian Healthcare Optimization Workshop.
 - Previously titled Multiple Observations and Goodness of Fit in Generalized Inverse Optimization.

¹Articles for operations research journals use alphabetical author ordering. The primary author is starred.

4. M. J. Crowson*, A. Hamour, **R. Mahmood**, V. Lin, D. Tucci, and T. C. Y. Chan, AutoAudio: Deep Learning for Automatic Audiogram Interpretation, *under review at The Laryngoscope*, 2019.

Journal Articles

1. A. Babier*, **R. Mahmood**, A. McNiven, A. Diamant, and T. C. Y. Chan, The Importance of Evaluating the Complete Knowledge-Based Planning Pipeline, *forthcoming in Physica Medica European Journal of Medical Physics*, 2020.
 - Preliminary version at the 2019 International Conference on the Use of Computers in Radiotherapy.
2. M. J. Crowson*, P. Dixon, **R. Mahmood**, J. W. Lee, D. Shipp, T. Le, V. Lin, J. Chen, and T. C. Y. Chan, Predicting Post-Operative Cochlear Implant Performance Using Supervised Machine Learning, *forthcoming in Otology & Neurotology*, 2020.
3. A. Babier*, **R. Mahmood**, A. McNiven, A. Diamant, and T. C. Y. Chan, Knowledge-based Automated Treatment Planning with Three-dimensional Generative Adversarial Networks, *Medical Physics*, 47, 297–306, 2019.
 - Preliminary version at the 2018 NeurIPS Workshop on Machine Learning for Health.
4. **R. Mahmood***, A. Badr, and A. Khisti, Streaming Codes for Multiplicative-Matrix Channels with Burst Rank Loss, *IEEE Transactions on Information Theory*, 64(7), 5296–5311, 2018.
 - Preliminary version at the 2016 International Symposium on Information Theory.
5. **R. Mahmood***, A. Badr, and A. Khisti, Convolutional Codes with Maximum Column Sum Rank for Network Streaming, *IEEE Transactions on Information Theory*, 62(6), 3039–3052, 2016.
 - Preliminary version at the 2015 International Symposium on Information Theory.

Conference Proceedings

1. A. Babier*, **R. Mahmood***, A. McNiven, A. Diamant, and T. C. Y. Chan, Automated Treatment Planning in Radiation Therapy with 3-D Generative Adversarial Networks, *NeurIPS Workshop on Machine Learning for Health*, 2018.
2. **R. Mahmood***, A. Babier, A. McNiven, A. Diamant, and T. C. Y. Chan, Automated Treatment Planning in Radiation Therapy with Generative Adversarial Networks, *Machine Learning for Healthcare*, Proceedings of Machine Learning Research 85, 484–499, 2018.
 - **Won Runners' Up at CORS 2019 HCOR Student Presentation Competition.**
3. **R. Mahmood***, A. Badr, and A. Khisti, Low Delay Network Streaming Under Burst Losses, *IEEE International Symposium on Information Theory*, 2898–2902, 2016.

4. **R. Mahmood***, A. Badr, and A. Khisti, Convolutional Codes with Maximum Column Sum Rank for Network Streaming, *IEEE International Symposium on Information Theory*, 2271–2275, 2015.
5. A. Badr*, **R. Mahmood**, and A. Khisti, Embedded MDS Codes for Multicast Streaming, *IEEE International Symposium on Information Theory*, 2276–2280, 2015.

Clinical Abstracts

1. A. Babier*, **R. Mahmood**, A. McNiven, A. Diamant, and T. C. Y. Chan, The Importance of Evaluating the Complete Knowledge-based Automated Planning Pipeline, *International Conference on the Use of Computers in Radiotherapy*, 2019.
2. A. Babier*, **R. Mahmood**, A. McNiven, and T. C. Y. Chan, An Optimization Method for Knowledge-based Automated Planning that Leverages Ensemble Dose Predictions, *American Association of Physicists in Medicine*, 2019.
3. A. Babier*, **R. Mahmood**, A. McNiven, and T. C. Y. Chan, Comparing Deep Learning Architectures for Knowledge-Based Automated Planning, *American Association of Physicists in Medicine*, 2019.

Presentations

Learning to Optimize with Hidden Constraints

(Scheduled) CORS Annual Conference, Toronto, ON, Canada	2020
NVIDIA AI Research Invited Seminar, Toronto, ON, Canada	2020
INFORMS Annual Meeting, Seattle, WA, USA	2019
CORS Annual Conference, Saskatoon, SK, Canada	2019
GERAD Invited Seminar, Université de Montréal, Montréal, QC, Canada	2019

An Ensemble Learning Framework for Model Fitting and Evaluation in Inverse Linear Optimization

INFORMS Health Care, Boston, MA, USA	2019
CORS Annual Conference, Saskatoon, SK, Canada	2019
CORS Annual Conference, Halifax, NS, Canada	2018
INFORMS Annual Meeting, Houston, TX, USA	2017
CORS Annual Conference, Quebec City, QC, Canada	2017
INFORMS Annual Meeting, Nashville, TN, USA	2016

Automated Treatment Planning in Radiation Therapy with Generative Adversarial Networks

CORS Annual Conference, Saskatoon, SK, Canada	2019
MLHC Conference, Palo Alto, CA, USA	2018

Convolutional Codes with Maximum Column Sum Rank for Network Streaming

IEEE ISIT, Hong Kong, HK, China

2015

Teaching Assistantship**MIE 465: Analytics in Action**

2017–2019

Responsible for curriculum development in 2017.

MIE 1620: Linear Programming and Network Flows

2018

MIE 258: Engineering Economics and Accounting

2016–2017

ECE 363: Communication Systems

2015

Students Supervised

1. Richard Chavez, Sliding Window Generative Adversarial Networks for Radiation Therapy, *Industrial Engineering 4th Year Thesis*, 2019. Co-supervised with Aaron Babier.
2. Michael Shin, Using Portfolio Theory to Optimize Selection of Daily Fantasy Basketball Contests, *Engineering Science 4th Year Thesis*, 2018. Co-supervised with Ben Potter.
3. Yusuf Shalaby, Inverse Optimization for Measuring Cancer Treatment Pathway Concor-
dance, *Industrial Engineering 4th Year Thesis*, 2018. Co-supervised with Nasrin Youssefi.
4. Palmira Pereira, Netflix Prize Problem Using Inverse Optimization, *Masters of Engineering Thesis*, 2017.

Awards

1. University of Toronto Doctoral Completion Award, 2019–2020 (\$8 000).
2. Runners' Up, Health Care Operations Research Student Presentation Competition, CORS Annual Conference, 2019.
3. Postgraduate Affiliation, Vector Institute for Artificial Intelligence, 2019 (\$12 000).
4. Honourable Mention, Student Paper Competition: Open Category, CORS Annual Confer-
ence, 2018 (\$100).
5. Postgraduate Doctoral Scholarship, NSERC, 2017 (\$42 000).
6. First Place, Waterfront International Ltd. Quantathon, 2016 (\$7 500).

Professional Experience

OpenKBP Grand Challenge , American Association of Physicists in Medicine Machine Learning Expert	2019–2020
Opus One Solutions , Toronto, ON, Canada Power Systems Optimization Expert	2019
NHL Expansion Draft Optimizer (http://nhlexpansiondraft.com) ² Back-end Software Developer	2017
Microsemi , San Jose, CA, USA Product Engineer Intern	2011–2012

Service

Referee for European Journal of Operations Research, IEEE ISIT (2017), NeurIPS ML4H Workshop (2019), and ACM CHIL (2020).

Electrical and Computer Engineering Graduate Student Society Treasurer	2014–2015
Electrical and Computer Engineering Graduate Students Symposium Organizing Committee Member	2014

Personal

Languages: English (fluent), French (beginner)

Citizenship: Canadian

Last updated: April 2, 2020
<http://rafidrm.github.io>

²This project received media coverage from *The Toronto Star* and others.