February 2024

PAWEL PRALAT
Curriculum Vitae

PERSONAL INFORMATION

Address:	Department of Mathematics, Office: ENG-237 **Toronto Metropolitan University** (formerly **Ryerson University**) 350 Victoria St., Toronto, ON, Canada, M5B 2K3
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Phone:	+1 416 979-5000 ext. 7421 (office)

WORK EXPERIENCE

May 2011 – **present**
Toronto Metropolitan University (formerly **Ryerson University**)
Department of Mathematics, Faculty of Science
350 Victoria St., Toronto, ON, **Canada**, M5B 2K3
Professor (**tenured**, April 2020 – **present**)
Associate Professor (**tenured**, March 2014 – April 2020)
Associate Chair for Research (July 2013 – June 2016)
Assistant Professor (**tenure-track**, July 2011 – March 2014)

October 2020 – **present**
SGH Warsaw School of Economics
Decision Analysis and Support Unit
Al. Niepodleglosci 162, 02-554 Warsaw, **Poland**
Adjunct Professor

September 2006 – **present**
Dalhousie University
Department of Mathematics and Statistics
Halifax, Nova Scotia, **Canada** B3H 3J5
Adjunct Professor (January 2008 – **present**)
Academic Post-doctoral Fellow (September 2006 – August 2009)
Modelling and Mining of Network Information Spaces
Supervisors: Jeannette Janssen and Evangelos Milios

August 2023 – December 2023
Simons Laufer Mathematical Sciences Institute
(formerly MSRI)
17 Gauss Way, Berkeley, CA 94720, **USA**
Algorithms, Fairness, and Equity
Research Member

August 2022 – December 2022
University of California Berkeley
Simons Institute for the Theory of Computing
121 Calvin Lab #2190, Berkeley, CA 94720-2190, **USA**
Graph Limits and Processes on Networks: From Epidemics to Misinformation
Visiting Long-Term Scholar

July 2016 – May 2023
The Fields Institute for Research in Mathematical Sciences
222 College St., Toronto, ON, **Canada**, M5T 3J1
Director of Fields–CQAM Lab on
Computational Methods in Industrial Mathematics (July 2018 – May 2023)
Assistant Director for Industry Liaison (July 2016 – June 2018)

September 2017 – December 2017	**University of California San Diego** Department of Mathematics 9500 Gilman Dr, La Jolla, CA 92093-0112, **USA** **Visiting Professor**
July 2009 – May 2011	**West Virginia University** Department of Mathematics 320 Armstrong Hall, Morgantown, WV 26506-6310, **USA** **Assistant Professor (tenure-track)**
May 2006 – August 2006	**Wilfrid Laurier University** Department of Mathematics 75 University Ave. W, Waterloo, Ontario, **Canada** N2L 3C5 **Post-doctoral Fellow** Supervisor: Anthony Bonato
January 2005 – August 2006	**University of Waterloo** Department of Combinatorics & Optimization 200 University Ave. W, Waterloo, Ontario, **Canada** N2L 3G1 **Adjunct Lecturer** (May 2006 – August 2006) **Post-doctoral Fellow** (January 2005 – April 2006) Supervisors: Nicholas Wormald and Penny Haxell
October 2000 – September 2009	**Adam Mickiewicz University** H.Wieniawskiego 1, 61-712 Poznań, **Poland** **Adjunct Professor** (February 2005 – September 2009) **Lecturer** (October 2001 – January 2005) **Academic teacher** (October 2000 – September 2001)
July 2002 – December 2004	**CCNA Local Academy** **(CISCO Networking Academy Program)** Legionów 6, 62-800 Kalisz, **Poland** **Instructor**
September 2001 – September 2004	**Higher Vocational State School of President Stanisław Wojciechowski** (PWSZ w Kaliszu) Nowy Świat 4, 62-800 Kalisz, **Poland** **Academic teacher**
June 2001 – September 2001	**Motorola Multiservice Networks Division** 400 Matheson Blvd. West, Mississauga, Ontario, **Canada** L5R 3M1 **Software developer, tester, and computer programmer**
February 2000 – May 2001	**"Pawkom"** Piotrkowska 79, Łódź, **Poland** Retail and wholesale computer trade and internet cafe' **Owner, general manager**

EDUCATION

October 2001 – September 2004	**Adam Mickiewicz University, Poznań, Poland** **Faculty of Mathematics and Computer Science** Department of Discrete Mathematics
Degree:	**Doctor of Philosophy (Ph.D.) in Mathematics and Computer Science** **Diploma with distinction**
Ph.D. dissertation:	*"Protean Graphs"* (a new probabilistic model of the web network) Supervisor: Tomasz Łuczak
October 1996 – June 2001	**Technical University of Lodz, Łódź, Poland** **Computer Science**, Specialization: Financial and Insurance Mathematics
Degree:	**Master**[1] **of Applied Science (M.A.Sc.) in Computer Science** **Bachelor**[1] **of Engineering (B.Eng.) in Computer Science**
M.A.Sc. thesis:	*"Wavelet representation of digital images"* Individual study process; study average: 4.82 out of 5 **(96.4%)** Supervisors: Tadeusz Poreda and Grzegorz Andrzejczak
October 1998 – September 2000	**University of Lodz, Łódź, Poland** **Mathematics**, Specialization: Theoretical Computer Science
Degree:	**Master**[1] **of Science (M.Sc.) in Mathematics**
M.Sc. thesis:	*"Lossless, dictionary based, compression algorithms"* Individual study process; study average: 4.96 out of 5 **(99.2%)** Supervisors: Adam Paszkiewicz and Stanisław Goldstein 17-th position in 3-rd Academic Nationwide Programming Competition (1998)
September 1992 – May 1996	**IIILO im. M.Kopernika w Kaliszu** (high school), **Kalisz, Poland** Profile in mathematics and physics. Winner of Math Competition (1994)

RESEARCH INTERESTS

My main research interests lie in network science with applications to real-world self-organizing networks such as the web graph or social networks. I am interested in both modelling as well as mining complex networks with emphasis on connections to designing ML tools. Both topics have experienced tremendous growth in the last few years, with an increasing number of applications in other areas of mathematics and computer science.

My Erdős Number is 2, through 8 of my co-authors: Noga Alon, Béla Bollobás, Fan Chung Graham, Hal Kierstead, Tomasz Łuczak, Mike Molloy, Douglas West, or Nick Wormald.

ACADEMIC AWARDS

July 2018 – June 2019	In 2018, I was awarded the 2018-19 Faculty of Science Scholarly, Research and Creative Activity Award (for tenured faculty members) given to recognize excellence in my research activities.
July 2012 – June 2013	In 2012, I was awarded the 2012-13 Faculty of Science Scholarly, Research and Creative Activity Award (for tenure-track faculty members) given to recognize excellence in my research activities.

[1] In the Polish university system (as in many other European countries) one used to receive an equivalent to a Masters degree after five years of study, with no Bachelor degree granted.

September 2007 – August 2009	SUN/ACEnet Research Fellow. Research program entitled *On-line Ramsey Numbers.* This program represents a critical component in ACEnet's mission to help provide researchers in Atlantic Canada with the resources required to help develop the high quality, innovative research programs necessary to achieve national and international recognition within their respective disciplines.
October 1999 – June 2000	In 1999, the Minister of National Education, M.Handke, awarded me a scholarship for outstanding academic achievements. This is the highest award a student can receive in Poland.
October 1998 – June 1999	In 1998, the President of University of Lodz, S.Liszewski, awarded me a scholarship for outstanding academic achievements.

FUNDING: RESEARCH AND SERVICE

Total amount: **$3,895,220**
Total amount for research: **$3,567,000**
Total amount for service: **$328,220**

$6,000, 01/2024 – 05/2024, *Classical and Structural Embeddings of Networks and Their Applications in Various ML Tasks* (Mitacs Globalink Research Award)
$194,000, 11/2022 – 11/2024, *Modelling and mining complex networks as hypergraphs* (NSERC Alliance International Collaboration Grant)
$212,500, 09/2022 – 08/2024, *Modelling and mining complex networks as hypergraphs* (The Tutte Institute for Mathematics and Computing (**$200,000**) complemented with the Fields Institute (**$12,500**))
$100,000, NAWA - *Machine learning models and tools for mining complex networks*; part of a larger, **$570,000** project: *Scientific and educational cooperation between SHG Warsaw School of Economics and its partners — applications in data analytics* (International Academic Partnerships, Polish National Agency for Academic Exchange), co-PI
$205,000, 04/2022 – 03/2027, *Modelling and Mining Complex Networks* (NSERC Discovery)
$100,000, 08/2021 – 08/2022, *Detecting and Responding to Hostile Information Activities: unsupervised methods for measuring the quality of graph embeddings* (Canadian Department of National Defense project with Patagona Technologies, complemented with SOSCIP grant)
$50,000, 08/2020 – 07/2021, *COVID-19: Agent-based framework for modelling pandemics in urban environment* (NSERC Alliance with Security Compass, complemented with SOSCIP COVID-19 Response Program)
$6,000, 09/2020 – 12/2020, *Embedding Complex Networks* (Mitacs Research Training Award)
$15,000, 06/2019 – 09/2019, *Improved transductive regression using interconnected data* (Mitacs Accelerate with Tesseraqt Optimization Inc)
$1,171,000, 10/2018 – 06/2020, *Secure and Smart Connected Cars* (NXM Technologies and Fields–CQAM) and *Quantum-Resistance and Efficiency of Communications in Connected and Autonomous Vehicles* (NSERC CRD and NXM Technologies), co-PI
$25,000, 01/2019 – 06/2019, *Online Detection of Users' Anomalous Activities on Confidential File Sharing Platform* (NSERC Engage with TitanFile)
$175,000, NAWA - *Hypergraphs theory and their applications in modelling social and economic systems*; part of a larger, **$700,000** project: *Strengthening and development of scientific and educational cooperation between SHG Warsaw School of Economics and its partners* (International Academic Partnerships, Polish National Agency for Academic Exchange), co-PI
$25,000, 09/2018 – 02/2019, *Automatic Personality Insights from Speech* (Ontario Centres of Excellence, Voucher for Innovation and Productivity with IMC Business Architecture)
$160,000, 07/2018 – 06/2020, *Computational Methods in Industrial Mathematics Fields–CQAM Lab* (The Fields Institute)
$25,000, 04/2018 – 10/2018, *Agent-based simulation modelling of out-of-home advertising viewing opportunity* (Ontario Centres of Excellence, Voucher for Innovation and Productivity with Environics Analytics)
$25,000, 06/2017 – 11/2017, *Cognitive Claims AI* (NSERC Engage with IMC Business Architecture)
$5,600, 07/2017, *Research visit to Nice, France* (Nice, Labex)
$115,000, 04/2017 – 03/2022, *Modelling and Mining Complex Networks* (NSERC Discovery)

$25,000, 09/2016 – 02/2017, *Modelling of Homophily and Social Influence via Random Graphs* (NSERC Engage with Alcatel-Lucent)
$4,500, 05/2016 – 08/2016, *Modelling Complex Networks Using Hypergraphs* (NSERC USRA)
$25,000, 09/2015 – 02/2016, *Relationship Mapping Analytics for Fundraising and Sales Prospect Research* (NSERC Engage with Charter Press Ltd.)
$99,600, 09/2015 – 08/2016, *Hypergraph Theory and Applications* (The Tutte Institute for Mathematics and Computing)
$4,500, 05/2015 – 08/2015, *Complex Networks and Modelling of Social Learning* (NSERC USRA)
$57,500, 11/2014 – 10/2015, *Web Visitor Engagement Measurement and Maximization* (Ontario Centres of Excellence Talent Edge Fellowship Program with The Globe and Mail)
$25,000, 10/2014 – 03/2015, *Utilizing big data for business-to-business matching and recommendation system* (NSERC Engage with ComLinked Corp.)
$25,000, 05/2014 – 10/2014, *A self-organizing dynamic network model increasing the efficiency of outdoor digital billboards* (NSERC Engage with KEEN Projection Media Ltd. (KPM))
$25,000, 03/2014 – 08/2014, *Exploiting Big Data for Customized Online News Recommendation System* (NSERC Engage with The Globe and Mail)
$25,000, 09/2013 – 02/2014, *Personalized Mobile Recommender System* (NSERC Engage with BlackBerry)
$1,500, 01/2013 – 12/2013, Travel Grant (Office for Science and Technology of the Embassy of France in Canada)
$25,000, 09/2012 – 02/2013, *Intelligent Rating System* (NSERC Engage with Mako)
$25,000, 06/2012 – 11/2012, *Dynamic clustering and prediction of taxi service demand* (NSERC Engage with Winston)
$100,000, 04/2012 – 03/2017, *Modelling and Searching Networks* (NSERC Discovery)
$5,000, 07/2011 – 03/2012, Modelling and Mining of Network Information Spaces (MPrime)
$275,000, since 07/2011, Various Internal Grants (Ryerson)
$20,000, 07/2011 – 06/2014, Start-up Grant (Ryerson)
$35,650 (*not accepted*), 01/2012 – 12/2013, *Modeling and Searching Networks* (National Security Agency)
$8,500 (*not accepted*), 04/2011 – 05/2011, Senate Research Grant (WVU), co-PI
$47,500, 04/2010 – 07/2011, ARTS Grant (WVU), *The Network Structure of Conflict and Consensus: Mathematical and Computational Tools for Understanding Social Complexity*, co-PI
$9,050, 08/2009 – 07/2011, Various internal grants (WVU)
$30,600, 07/2009 – 08/2011, Start-up Grant (WVU)
$30,000, 09/2007 – 08/2009, Research Fellowship (SUN/ACEnet)
$18,000, 09/2006 – 08/2009, Travel and Equipment Grants (MITACS)

$10,000, 06/2023, WAW 2023 (Fields)
$4,300, 09/2020, WAW 2020 (Ryerson, Google, MIPT)
$20,000, 02/2020, Blockchain Technology Symposium BTS 2020 (The Fields Institute)
$6,000, 08/2019, Summer School on Data Science Tools and Techniques in Modelling Complex Networks (Fields–CQAM, Ryerson University)
$8,000, 08/2019, GrasCAN 2019 (Fields, Ryerson University)
$10,000, 07/2019, WAW 2019 (The University of Queensland, ACEMS, INRIA, Google, MIPT)
$2,500, 01/2019, Workshop on Optimization Techniques for Data Science in Python and Julia (Fields–CQAM)
$49,100, 08/2018, Blockchain Technology — from Hype to Reality (The Fields Institute, Ryerson, NSF, Burnir Group, NSERC, Northern Block, Coinfirm, MIPT)
$4,450, 05/2018, WAW 2018 (Microsoft, Google)
$2,700, 05/2018, Erasmus+ KA107 2017 project (visiting Warsaw School of Economics)
$9,390, 06/2017, WAW 2017 (Microsoft, NSERC, Google, Yandex, MIPT)
$6,800, 12/2016, WAW 2016 (Google Research, Yandex, Ryerson University)
$110,000, 05-06/2017, Short Thematic Program on Random Graphs and Their Applications to Complex Networks (The Fields Institute)
$28,200, 10/2015, Cargese Fall School on Random Graphs (ANR, CNRS, EDSFA, Ryerson University, Université Nice Sophia Antipolis)
$9,000, 12/2014, WAW 2014 (Microsoft Research, Google Research, Ryerson University)
$17,130, 12/2013, WAW 2013 (NSF, Microsoft Research, Google Research, Ryerson University)
$14,650, 05/2011, WAW 2011 (NSF, WVU, Microsoft Research, Google Research, Yahoo! Research, Telefonica Research)
$14,000, 08/2009 – 07/2011, Math/CS Colloquium (WVU, Math+CS)

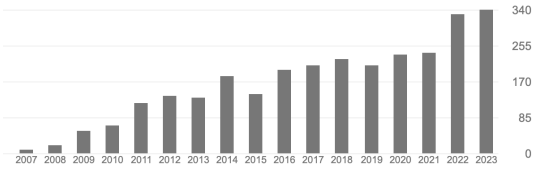
PUBLICATIONS

- Summary:
  Books: 4
  Book chapters: 1
  Volumes edited: 10
  Papers: 210
  Papers in refereed journals: 161 (146 published, 2 accepted, 13 submitted)
  Papers in refereed conference proceedings: 47 (42 published, 4 accepted, 1 submitted)
  Unpublished manuscripts: 2

- Progress: the first paper published in 2006, 4 in 2007, 8 in 2008, 9 in 2009, 13 in 2010, 12 in 2011, 11 in 2012, 13 in 2013, 14 in 2014, 11 in 2015, 17 in 2016, 11 in 2017, 12 in 2018, 8 in 2019, 9 in 2020, 9 in 2021, 12 in 2022, 13 in 2023, 2 in 2024 (until February, 2024), 6 accepted, 14 submitted

- Google Scholar (updated November 2023)

	All	Since 2018
Citations	2893	1577
h-index	29	19
i10-index	93	55



BOOKS

B 228. S. Matwin, A. Milios, P. Prałat, A. Soares, and F. Théberge, **Generative Methods for Social Media Analysis**, *SpringerBriefs in Computer Science*, Springer, 2023.

B 227. B. Kamiński, P. Prałat, and F. Théberge, **Mining Complex Networks**, CRC Press, 2021.

B 226. B. Kamiński and P. Prałat, **Train Your Brain—Challenging Yet Elementary Mathematics**, CRC Press, 2020.

B 225. A. Bonato and P. Prałat, **Graph Searching Games and Probabilistic Methods**, CRC Press, 2017.

BOOK CHAPTERS

C 224. B. Kamiński and P. Prałat, **Mathematical Foundations of Decision Trees**, in **Modeling Decision Trees with SilverDecisions** by B. Kamiński, M. Jakubczyk, and P. Szufel, SGH Publishing House, Warsaw, 2022.

VOLUMES EDITED

V 223. M. Dewar, P. Prałat, P. Szufel, F. Théberge, and M. Wrzosek (eds.), **Proceedings of the 18th Workshop on Algorithms and Models for the Web-Graph (WAW2023)**, Lecture Notes in Computer Science **13894**, Springer, 2023.

V 222. B. Kamiński, P. Prałat, and P. Szufel (eds.), **Proceedings of the 17th Workshop on Algorithms and Models for the Web-Graph (WAW2020)**, Lecture Notes in Computer Science **12091**, Springer, 2020.

V 221. K. Avrachenkov, P. Prałat, and N. Ye (eds.), **Proceedings of the 16th Workshop on Algorithms and Models for the Web-Graph (WAW2019)**, Lecture Notes in Computer Science **11631**, Springer, 2019.

V 220. A. Bonato, P. Prałat, and A. Raigorodskii (eds.), **Proceedings of the 15th Workshop on Algorithms and Models for the Web-Graph (WAW2018)**, Lecture Notes in Computer Science **10836**, Springer, 2018.

V 219. A. Bonato, F. Chung Graham, and P. Prałat (eds.), **Proceedings of the 14th Workshop on Algorithms and Models for the Web-Graph (WAW2017)**, Lecture Notes in Computer Science **10519**, Springer, 2017.

V 218. A. Bonato, F. Chung Graham, and P. Prałat (eds.), **Proceedings of the 13th Workshop on Algorithms and Models for the Web-Graph (WAW2016)**, Lecture Notes in Computer Science **10088**, Springer, 2016.

V 217. A. Bonato, F. Chung Graham, and P. Prałat (eds.), **Proceedings of the 11th Workshop on Algorithms and Models for the Web-Graph (WAW2014)**, Lecture Notes in Computer Science **8882**, Springer, 2014.

V 216. A. Bonato, M. Mitzenmacher, and P. Prałat (eds.), **Proceedings of the 10th Workshop on Algorithms and Models for the Web-Graph (WAW2013)**, Lecture Notes in Computer Science **8305**, Springer, 2013.

V 215. A. Frieze, P. Horn, and P. Prałat (eds.), **Proceedings of the 8th Workshop on Algorithms and Models for the Web-Graph (WAW2011)**, Lecture Notes in Computer Science **6732**, Springer, 2011.

V 214. J. Janssen and P. Prałat (eds.), **Proceedings of the 4th Workshop on Combinatorial and Algorithmic Aspects of Networking (CAAN2007)**, Lecture Notes in Computer Science **4852**, Springer, 2007.

SUBMITTED PAPERS

Copies of papers available at my web page. Prefix **J** states for journal paper and **P** for proceeding one.

J 213. M. Molloy, P. Prałat, and G. Sorkin, **Matchings and loose cycles in the semi-random hypergraph model**, *Random Structures and Algorithms*, submitted: 01/2024.

J 212. B. Pankratz, B. Kamiński, and P. Prałat, **Performance of Community Detection Algorithms Supported by Node Embeddings**, *Journal of Complex Networks*, submitted: 01/2024, 27pp.

J 211. B. Kamiński, P. Prałat, F. Théberge, and S. Zając, **Predicting Properties of Nodes via Community-Aware Features**, *Social Network Analysis and Mining*, submitted: 12/2023, 26pp.

J 210. A. Eide and P. Prałat, **Linear Colouring of Binomial Random Graphs**, *Discrete Mathematics*, submitted: 11/2023, 15pp.

J 209. A. Frieze, P. Gao, C. MacRury, P. Prałat, and G. Sorkin, **Building Hamiltonian Cycles in the Semi-Random Graph Process in Less Than $2n$ Rounds**, *European Journal of Combinatorics*, submitted: 12/2023, 28pp.

P 208. D. Mohan and P. Prałat, **Asynchronous Majority Dynamics on Binomial Random Graphs**, *Proceedings of 51st EATCS International Colloquium on Automata, Languages and Programming (ICALP 2024)*, submitted: 11/2023, 26pp.

J 207. M. Antosiewicz, P. Szufel, A. Skorupka, B. Kamiński, P. Prałat, and A. Mashatan, **Clustering Problem in Self-Organizing Networks on the Example of Smart Vehicle Transportation System**, *EURO Journal on Transportation and Logistics*, submitted: 12/2023, 26pp.

J 206. M. Opalski, P. Szufel, B. Kamiński, A. Mashatan, and P. Prałat, **Optimal roadworks schedule in multi-agent transportation models**, *European Journal of Transport and Infrastructure Research*, submitted: 04/2023, 18pp.

J 205. D. Gamarnik, M. Kang, and P. Prałat, **Cliques, Chromatic Number, and Independent Sets in the Semi-random Process**, *SIAM Journal on Discrete Mathematics*, submitted: 03/2023, 21pp.

J 204. M. Kiwi, L. Lichev, D. Mitsche, and P. Prałat, **Label propagation on binomial random graphs**, *Electronic Journal of Probability*, submitted: 10/2023, 36pp.

J 203. M. Delcourt, R. Huq, and P. Prałat, **Almost all 9-regular graphs have a modulo-5 orientation**, *Electronic Journal of Combinatorics*, submitted: 10/2023, 18pp.

J 202. P. Bennett, R. Cushman, A. Dudek, and P. Prałat, **The Erdős-Gyárfás function $f(n, 4, 5) = \frac{5}{6}n + o(n)$ — so Gyárfás was right**, *Journal of Combinatorial Theory, Series B*, submitted: 07/2022, 35pp.

J 201. K. Georgiou, S. Kundu, and P. Prałat, **Makespan Trade-offs for Visiting Triangle Edges**, *Discrete Mathematics & Theoretical Computer Science*, submitted: 11/2021, 47pp.

J 200. N.C. Behague, T. Marbach, P. Prałat, and A. Ruciński, **Subgraph Games in the Semi-Random Graph Process and Its Generalization to Hypergraphs**, *Electronic Journal of Combinatorics*, submitted: 02/2023, 18pp.

ACCEPTED PAPERS

J 199. C. MacRury, N. Polituchyi, P. Prałat, K. Siuta, and P. Szufel, **Optimizing transport frequency in multi-layered urban transportation networks for pandemic prevention**, *Public Transport*, accepted: 02/2024, submitted: 09/2022, 29pp.

P 198. N. Arnosti, B. Kamiński, P. Prałat, and M. Zawisza, **Impact of Market Design and Trading Network Structure on Market Efficiency**, *Proceedings of 19th Workshop on Modelling and Mining Networks (WAW2024)*, accepted: 02/2024, submitted: 01/2024, 15pp.

P 197. A. Dehghan, P. Prałat, and F. Théberge, **Network Embedding Exploration Tool (NEExT)**, *Proceedings of 19th Workshop on Modelling and Mining Networks (WAW2024)*, accepted: 02/2024, submitted: 12/2023, 15pp.

P 196. J. Barrett, B. Kamiński, P. Prałat, and F. Théberge, **Self-similarity of Communities of the ABCD Model**, *Proceedings of 19th Workshop on Modelling and Mining Networks (WAW2024)*, accepted: 02/2024, submitted: 11/2023, 15pp.

J 195. D. Bal, A. Frieze, and P. Prałat, **Rainbow spanning trees in randomly coloured G_{k-out}**, *SIAM Journal on Discrete Mathematics*, accepted: 10/2023, submitted: 11/2022, 17pp.

P 194. B. Kamiński, P. Prałat, F. Théberge, and S. Zając, **Classification Supported by Community-Aware Node Features**, *Proceedings of the 12th International Conference on Complex Networks and their Applications*, accepted: 09/2023, submitted: 09/2023, 12pp.

REFEREED PUBLICATIONS

2024

J 193. A. Dehghan, K. Siuta, A. Skorupka, A. Betlen, D. Miller, B. Kamiński, and P. Prałat, **Unsupervised Framework for Evaluating and Explaining Structural Node Embeddings of Graphs**, *Journal of Complex Networks* **12(2)** (2024), cnae003.

J 192. P. Prałat and H. Singh, **Power of k Choices in the Semi-Random Graph Process**, *Electronic Journal of Combinatorics* **31(1)** (2024), #P1.11

2023

P 191. K. Georgiou, S. Kundu, and P. Prałat, **The Fagnano Triangle Patrolling Problem**, *Proceedings of the 25th International Symposium on Stabilization, Safety, and Security of Distributed Systems (SSS 2023)*, Lecture Notes in Computer Science **14310**, Springer, 2023, 157–171.

J 190. B. Kamiński, P. Prałat, and F. Théberge, **Hypergraph Artificial Benchmark for Community Detection (h-ABCD)**, *Journal of Complex Networks* **11(4)** (2023), cnad028.

J 189. A. Bonato, K. Georgiou, C. MacRury, and P. Prałat, **Probabilistically Faulty Searching on a Half-Line**, *Algorithmica* **85** (2023), 2485–2514.

J 188. A. Dehghan, K. Siuta, A. Skorupka, A. Dubey, A. Betlen, D. Miller, W. Xu, B. Kamiński, and P. Prałat, **Detecting Bots in Social-Networks Using Node and Structural Embeddings**, *Journal of Big Data* **10** (2023), 119.

J 187. D. Dereniowski, P. Gordinowicz, and P. Prałat, **Edge and Pair Queries—Random Graphs and Complexity**, *Electronic Journal of Combinatorics* **30(2)** (2023), #P2.34.

J 186. B. Kamiński, P. Prałat, and F. Théberge, **Artificial Benchmark for Community Detection with Outliers (ABCD+o)**, *Applied Network Science* **8** (2023), 25.

P 185. B. Kamiński, P. Misiorek, P. Prałat, and F. Théberge, **Modularity Based Community Detection in Hypergraphs**, *Proceedings of the 18th Workshop on Algorithms and Models for the Web-Graph (WAW2023)*, Lecture Notes in Computer Science **13894**, Springer, 2023, 52–67.

P 184. A. Dehghan, K. Siuta, A. Skorupka, A. Betlen, D. Miller, B. Kamiński, and P. Prałat, **Unsupervised Framework for Evaluating Structural Node Embeddings of Graphs**, *Proceedings of the 18th Workshop on Algorithms and Models for the Web-Graph (WAW2023)*, Lecture Notes in Computer Science **13894**, Springer, 2023, 36–51.

P 183. B. Pankratz, B. Kamiński, and P. Prałat, **Community Detection Supported by Node Embeddings (Searching For a Suitable Method)**, *Proceedings of the 11th International Conference on Complex Networks and their Applications*, Studies in Computational Intelligence **1078**, Springer, 2023, 221–232.

P 182. B. Kamiński, P. Prałat, and F. Théberge, **Outliers in the ABCD Random Graph Model with Community Structure (ABCD+o)**, *Proceedings of the 11th International Conference on Complex Networks and their Applications*, Studies in Computational Intelligence **1078**, Springer, 2023, 163–174.

P 181. B. Kamiński, B. Pankratz, P. Prałat, and F. Théberge, **Modularity of the ABCD Random Graph Model with Community Structure**, *Proceedings of the 11th International Conference on Complex Networks and their Applications*, Studies in Computational Intelligence **1078**, Springer, 2023, 3–15.

J 180. L. Lichev, D. Mitsche, and P. Prałat, **Localization Game for Random Geometric Graphs**, *European Journal of Combinatorics* **108** (2023), 103616.

J 179. A. Logan, M. Molloy, and P. Prałat, **A variant of the Erdős-Rényi random graph process**, *Journal of Graph Theory* **102(2)** (2023), 322–345.

2022

J 178. B. Kamiński, Ł. Kraiński, P. Prałat, and F. Théberge, **A Multi-purposed Unsupervised Framework for Comparing Embeddings of Undirected and Directed Graphs**, *Network Science* **10(4)** (2022), 323–346.

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COLLABORATION WITH INDUSTRY PARTNERS

Detecting and Responding to Hostile Information Activities: unsupervised methods for measuring the quality of graph embeddings
Canadian Department of National Defense project with Patagona Technologies (completed, 2021-22) (**complemented with SOSCIP grant**)

The rise in online organized disinformation campaigns present a significant challenge to Canadian national security. State and non-state hostile actors manipulate users on social media platforms to advance their interests. Patagona Technologies is a Toronto-based software development company started by two Ryerson alumni. We are currently working with the Canadian Department of National Defense to address the challenges posed by online hostile actors by analysing the structure and content of social networks.

Graph embeddings allow discrete mathematical graphs such as social networks to be mapped to sets of vectors of real values in a way that preserves certain properties of the original graph. Graph embeddings present a convenient representation for developing machine learning models to analyse graphs. Unfortunately the quality of these models is only as good as the quality of the embeddings so a method for evaluating the quality of embeddings is required.

This research project will expand on prior work done by Dr. Pralat on unsupervised methods for measuring the quality of graph embeddings. Specifically, this work will involve studying unsupervised methods for measuring the

quality of structural graph embeddings (that is, struc2vec, GraphWave), as well as extending the random graph models used by these methods to multi-relational graphs.

COVID-19: Agent-based framework for modelling pandemics in urban environment
NSERC Alliance project with Security Compass (completed, 2020-21)
(**complemented with SOSCIP COVID-19 Response grant**)

The development of COVID-19 pandemic raises important questions on optimal policy design for managing and controlling the number of people affected. In order to answer these questions, one needs to better understand determinants of pandemic dynamics. Indeed, the development of epidemics depends on various factors including the intensity and frequency of social contacts and the amount of care and protection applied during those contacts. In particular, one area where the disease can be transmitted is the urban space of a large city such as Toronto.

The goal of the project is to create an agent-based framework for building virtual models of an urban area. This framework will be used as a virtual laboratory for testing various scenarios and their implications for the development of pandemics. In order for conclusions to be reliable, the models (known in the literature as synthetic population models or digital twins) have to be up to scale, with the number of agents comparable with the population of the city. This, in turn, requires implementations ready to be run in a large scale distributed computing environment in the cloud (for example, using the Elastic Compute Cloud - EC2 service at Amazon Web Services - AWS) as the algorithms behind the engine need high performance computing power.

The framework will allow us to evaluate different COVID-19 mitigation policy designs. This includes possible decisions such as decreasing proneness to wearing masks, closing down some non-essential, high-contact, social network nodes (for example, hairdressers), limiting the number of people having simultaneous social gatherings or reducing the number of people on streets altogether via promoting actions such as #stayathome.

Embedding Complex Networks
Mitacs Research Training Award (RTA) (completed, 2020)

The goal of many machine learning applications is to make predictions or discover new patterns using graph-structured data as feature information. In order to extract useful structural information from graphs, one might want to try to embed it in a geometric space by assigning coordinates to each node such that nearby nodes are more likely to share an edge than those far from each other. There are many embedding algorithms (based on techniques from linear algebra, random walks, or deep learning) and the list constantly grows. Moreover, many of these algorithms have various parameters that can be carefully tuned to generate embeddings in some multidimensional spaces, possibly in different dimensions. The main question we try to answer in this research project is: How do we evaluate these embeddings? Which one is the best and should be used for a given task at hand?

In order to answer these questions, we propose a general framework that assigns the divergence score to each embedding which, in an unsupervised learning fashion, distinguishes good from bad embeddings. In order to benchmark embeddings, we generalize the Chung-Lu random graph model to incorporate geometry. The goal of this research project is to do a detailed grand study of the best graph embedding algorithms (Node2Vec, VERSE, LINE, GraphSAGE, Deep Walk, Struc2Vec, HOPE, SDNE, GCN, HARP) by performing a series of tests for a given application at hand as well as using our framework.

Improved transductive regression using interconnected data
Mitacs Accelerate project with Tesseraqt Optimization Inc (completed, 2019)

The explosion of labeled data from personal phones, apps, and sensors have enabled powerful supervised machine learning algorithms. However, in many real world learning applications, the quantity of unlabeled data far exceeds that of good quality labeled data. In situations such as these, where the unlabeled data is available to the learning algorithm, transductive (as opposed to inductive) learning can be useful. Most studies of transductive learning methods focus on transductive classification problems and label propagation. Extensions to transductive regression has been basic and relatively unexplored. This project aims to develop novel and improved transductive learning algorithms on hypergraphs to be applied in regression problems. Unlike graphs, hypergraphs can robustly incorporate data that involves relationships that are richer and more complex than pairwise. Representing these complex relationships in a pairwise fashion inevitably results in loss of information and ambiguity, which can degrade the performance of learning algorithms. This project will explore the use of hypergraphs to unify and integrate sparsely labelled data with other, complex data sources with the aim of improving state of the art transductive regression methods. The scope of the project will be to design and benchmark these new algorithms as well as study the characteristics of the related data sets that are most suitable for this type of approach.

Quantum-Resistance and Efficiency of Communications in Connected and Autonomous Vehicles
NSERC Collaborative Research and Development + Fields CQAM project with NXM Technologies Inc. (completed, 2018-22), co-PI

NXM Labs is making secure Internet-of-Things (IoT) devices for connected and autonomous vehicles. These devices are small and contain sensitive information and it is therefore critical to ensure these devices remain secure for the lifetime of the car. In their solution, NXM also uses a blockchain based authentication mechanism. Both IoT and blockchain technologies use encryption techniques for confidentiality and integrity of the information, but the currently deployed encryption standards are vulnerable against future quantum computers. Therefore, this project aims at designing techniques to make IoT and blockchain quantum-resistant using a combination of classical and quantum resistant cryptographic approaches. As an IoT world becomes closer to reality, the necessity of ensuring the security of its communication and data becomes increasingly important. Generations of devices will have been made and be in use while quantum computers become more sophisticated and powerful. As such, protecting IoT devices against future quantum attacks in the present is a priority. Another aspect of this project focuses more effective and efficient strategies for communications among connected vehicles that will be developed alongside the quantum-resistant technologies and will ensure the future security and efficiency of NXM's technologies moving forward.

Online Detection of Users' Anomalous Activities on Confidential File Sharing Platform
NSERC Engage project with TitanFile (completed, 2018-19)

TitanFile is a platform for exchanging confidential documents with authorized parties outside of the organization. The external sharing of confidential documents raises the risk of data exfiltration to unauthorized parties, whether maliciously or unintentionally due to human error. To mitigate this risk, we ask the following question: "is it possible to detect user activities that have symptoms of fraudulent or unintended behaviour in real time based on the user's activity pattern and available metadata describing the transaction?"

The goal of the project is to construct a system for online detection of malicious, spurious or erroneous activity of TitanFile's users. The targeted activities to be detected include: data theft, data exfiltration, external correspondence and file sharing. Those events can occur as a result of user mistakes or intentional actions.

The result of the project will be an analytical model that will generate typical profiles across customers and identify anomalies in their behaviour. Sample activities include: employees sending company data to unauthorized persons, accidentally communicating with the wrong person and sending confidential data to personal accounts. The system will be designed work in real time analyzing log streams of TitanFile - for each logged event the classifier will output a binary decision along with a confidence level. The solution will be provided with a Python module API for an easy integration with the existing TitanFile's infrastructure.

Automatic Personality Insights from Speech
Ontario Centres of Excellence, Voucher for Innovation and Productivity with IMC Business Architecture (completed, 2018-19)

IMC Business Architecture (IMCBA) has been developing a suite of innovative computational tools for automatic assessment of personality traits based on analysis of recordings of human speech. At the current stage, a prototype system has been developed that is able to estimate, by means of analysis of samples of recorded speech, customer time thinking styles according to MindTime personality classification system. Based on numerous positive results obtained so far, IMCBA believes that the precision of the results generated by their system will be significantly improved by analyzing the acoustic layer of speech samples along with their semantic content. The ability to derive insights on emotional states and personality traits from spoken word has been hypothesized and investigated in psychology for a long time. Whereas earlier works were mainly concerned with personality perception by humans in human to human interactions, recent research has focused on automatic extraction and quantification of personality cues from speech by computerized systems. In both cases significant correlation between certain properties of a speech signal, known as prosodic features, and personality scores has been observed. Incorporating such type of analysis into IMCBA analytical suite will allow to improve market value of their offering and gain advantage over competitors.

Agent-based simulation modelling of out-of-home advertising viewing opportunity
Ontario Centres of Excellence, Voucher for Innovation and Productivity with Environics Analytics (completed, 2018)

Many Canadian and American firms and agencies that use out-of-home (OOH) advertising to promote their products are interested in their targeting campaigns towards specific consumer segments. A successful advertising

campaign requires a certain level of advertising viewing 'opportunity-to-see' frequency of exposure in order for the brands and products to be remembered by potential customers and a right level of customer reach. Currently the out-of-home industry, especially in Canada, is seriously out of date and increasingly recognized as such.

The goal of the project is to create integrated multi-source simulation model that will allow Environics Analytics to design revolutionary and highly targeted optimal marketing campaigns for their customers. This, in turn, will allow for a better differentiation of promotional actions and so be more valuable for the customers - the advertising firms. Companies planning their marketing actions along with Environics Analytics will be able better to target desired socioeconomic groups and segments and to understand and to predict the response and impacts of their advertising campaigns.

Cognitive Claims AI
NSERC Engage project with IMC Business Architecture (completed, 2017)

IMC is developing a tool for the Property & Casualty (P&C) insurance industry. P&C companies are seeking ways to minimize their cost of claims (currently running at some 60% of premiums) as well as increase their rate of fraud detection, which they estimate at 10% of actual fraud.

IMC believes it is possible to improve this performance by using available data to predict the behaviour of the claimant and treat them appropriately. The most useful data would be the statement of claim by the customer, however, as this is in the form of a telephone interview, it is not readily useable for algorithmic modelling. Therefore, IMC is seeking to find a way of turning the content of the statement of claim into data useable for predictive modelling of the claim outcome. IMC has identified a number of tools for converting natural language data into numerical scores, but the considered prediction problems are non-standard and so require development of novel approaches to data modelling. The opportunity to collaborate with Dr. Pralat in researching the potential for such algorithms will allow IMC to determine if this tool represents a viable opportunity.

Modelling of Homophily and Social Influence via Random Graphs
NSERC Engage project with Alcatel-Lucent (completed, 2016-17)

The proliferation of cellular usage has given rise to massive amounts of data that, through data mining and analytics, promises to reveal a wealth of information on how agents interact with one another and effect one another's preferences. For example, cellular devices frequently communicate with cell towers, from which agent locations, and hence, agent activity profiles, are readily available. The company aims to understand the interconnections between agent profiles and, in particular, how these profiles co-evolve over time.

It is through the lens of social learning that we propose to model and derive value from agent profiles. The first step is to understand the social environments of the agents which is both shaped by the agents and influences the agents to adopt new behaviours. So, any relevant theory of social learning must account for at least two interrelated factors: network change as a result of agent attributes, and attribute updating as a result of network position. Two leading hypotheses in this area are that network ties are formed and deleted based on similarity or differences in agent attributes (homophily), and that certain attributes are likely to diffuse through existing network ties (social influence). This project aims to determine whether or not homophily and social influence are good models of networks described by agent location data and then use the resultant models to develop scalable analytics algorithms.

Hypergraph Theory and Applications
Project with The Tutte Institute for Mathematics and Computing (completed, 2015-16)

Myriad problems can be described in hypergraph terms, however, the theory and tools are not sufficiently developed to allow most problems to be tackled directly within this context. Hypergraphs are of particular interest in the field of knowledge discovery where most problems currently modelled as graphs would be more accurately modelled as hypergraphs. Those in the knowledge discovery field are particularly interested in the generalization of the concepts of modularity and diffusion to hypergraphs. Such generalizations require a firm theoretical base on which to develop these concepts. Unfortunately, although hypergraphs were formally defined in the 1960s (and various realizations of hypergraphs were studied long before that), the general formal theory is not as mature as required for the applications of interest to the TIMC. The TIMC wishes to encourage the development of this formal theory, in conjunction with development of concrete applications.

Relationship Mapping Analytics for Fundraising and Sales Prospect Research
NSERC Engage project with Charter Press Ltd. (completed, 2015-16)

Third Sector Publishing (TSP) has been successful selling CharityCAN subscriptions to fundraising organizations across Canada. This has been the result of incorporating a large volume of data from different sources that prospect researchers find useful as they attempt to identify potential donors for their organizations. For example, the Canadian data that TSP licenses from Blackbaud, Inc. includes over 7.3 million donation records - records of donations that individuals, foundations, and companies made to which organizations.

As well as licensed data, there is an abundance of publicly available data that will be useful to CharityCAN subscribers. TSP will be able to extract this data from websites through automated extraction processes. For example, most law firms in Canada create and post for free biographies of their lawyers. TSP will be able to add these biographies to the growing volume of useful data that already can be found on the CharityCAN platform.

The challenge for CharityCAN is connecting this growing number of data points. Relationship mapping refers to the identification of relationships among individuals. Relationship mapping becomes particularly useful when it can predict the strength or weakness of any relationship. CharityCAN requires sophisticated machine learning algorithms and data mining tools that will identify relationships among individuals, private-sector companies, and non-profit institutions, and then these algorithms should be able to predict the strength (or lack thereof) of these relationships. As a result, various (complex) networks could be formed and, with this in hand, some hybrid clustering methods could be used to extract groups of users that are potentially of interest to the subscribing institution or company (for example, for personalized and targeted solicitation).

Web Visitor Engagement Measurement and Maximization
Ontario Centres of Excellence Talent Edge Fellowship Program with The Globe and Mail (completed, 2014-15)

A very important measure of how well a news website is doing in providing content, as well as how attractive they are to advertisers, is how engaged their visitors are with their site. News websites need to maximize visitor engagement, however, they do not currently have an accurate way to measure engagement. Ideally they could measure a visitors time spent looking at their website, but the web analytics software available in the marketplace all fall short in their ability to do this accurately, as they always miss the last page of a visit, and they include time that they should not (for example, when a visitor physically has walked away from their computer). The Globe and Mail is seeking a machine learning & big data solution to help them accurately measure engagement, and to then optimize for it. They need tools that help them optimize the selection of articles promoted on their section homepages at any given time, as well as their ordering, such that engagement is maximized.

Utilizing big data for business-to-business matching and recommendation system
NSERC Engage project with ComLinked Corp. (completed, 2014-15)

The social media industry is experiencing a tremendous amount of growth and innovation with new business models being developed especially in the B2C space. With the success of social media platforms such as Facebook, Twitter, and LinkedIn, the commercial segment has been looking to consolidate the main features and functionalities of these B2C platforms and apply it to solve real-life B2B problems. ComLinked is an online B2B platform where companies across all industries can create their online business profiles, and in addition to their basic company information, can list specific company information such as their founding year, their products and services and their customer's industries. Based on these elements, the platform uses matching algorithms to recommend companies to other companies to connect to. ComLinked Corp. is seeking to collaborate with the academic community to develop its core set of algorithms utilizing machine learning & big data solution.

A self-organizing dynamic network model increasing the efficiency of outdoor digital billboards
NSERC Engage project with KEEN Projection Media Ltd. (KPM) (completed, 2014)

KPM is developing a business model for infrastructure development and management (Coop Billboard Network — CBN — www.coopbn.com) with the goal of creating an optimum working platform which consolidates multiple LED outdoor billboards (of various designs, ages, models, suppliers, locations, etc.) under one umbrella (similar to what Expedia does to the hotel business). The company is looking for a dynamic system that assigns user requests to specific billboards and optimizes the network in a self-organizing manner. Modelling should play an important role in this system, since it is expected that the system will be able to predict future requests and available time slots based on the history of the process as well as current trends. The system is supposed to have some artificial intelligence built-in to not only predict these events but also self-correct the network behaviour in order to increase the efficiency and global performance of the network.

Exploiting Big Data for Customized Online News Recommendation System
NSERC Engage project with The Globe and Mail (completed, 2014)

The news industry is undergoing major changes, with competition from non-traditional, international competitors negatively impacting both readership levels (pageviews) and the ad revenue associated to each pageview. The Globe and Mail is seeking a machine learning & big data solution to help them come out on top in this period of change. A system that offers personalized content recommendations to each user would help greatly. However, because their content library, akin to a product catalog at a retailer, changes dramatically every minute with the arrival of fresh news articles, traditional recommender systems would have a very hard time providing good recommendations of fresh articles. Traditional recommender systems also fail to consider popularity as a function of how much a piece of content was promoted, and the business consideration of the revenue driven by a piece of content. This project will combine big data and advanced algorithms to account for these considerations while driving personalized content recommendations.

Personalized Mobile Recommender System
NSERC Engage project with BlackBerry (completed, 2013-14)

We are developing a series of recommendation algorithms to enhance the mobile user experience. The algorithms will utilize mobile user behavioural data and application contents to determine the most relevant applications to recommend to the end users. The system will be developed on the leading edge big data platform Apache Hadoop and algorithms will need to be distributed to hundreds of computing nodes and scale to millions of users and items. The leading edge algorithms we design will be benchmarked against industry standard algorithms on performance and scalability.

Intelligent Rating System
NSERC Engage project with Mako (completed, 2012-13)

We are developing a series of formulas and algorithms to map a new artificial intelligence rating system online. The core of the platform is to utilize advanced statistical and technological indicators to determine rank of the reviewed subject, with the biggest nugget being the ability to identify the quality/merit of each review based on many interconnected variables.

Dynamic clustering and prediction of taxi service demand
NSERC Engage project with Winston (completed, 2012)

The Winston mobile phone application completely transforms the archaic end-to-end taxi experience. By leveraging mobile technology and working with established, professional limousine service providers, they are able to connect users to car service in a way that makes sense today. Although they have a large amount of potentially important and relevant data, they have no tools to use it to improve their system efficiency. The goal of this project is to use the aggregated data to improve the demand prediction. By better predicting where and what time the demands are likely to occur using historical data, it should be possible to better allocate a driver's location in order to minimize passenger wait time and maximize coverage. The algorithm should automatically adapt and improve as more and more data are aggregated.

PROGRAM COMMITTEE MEMBER

- June 2024 (co-organizer) *The 19th Workshop on Modelling and Mining Networks (WAW 2024)*, **SGH Warsaw School of Economics, Warsaw, Poland**
- November 2023 *The 12th International Conference on Complex Networks and their Applications*, **French Riviera, France**
- May 2023 (co-organizer) *The 18th Workshop on Algorithms and Models for the Web Graph (WAW 2023)*, **Fields Institute for Research in Mathematical Sciences, Toronto, Canada**
- May 2023 (co-organizer) *Workshop on Modelling and Mining Complex Networks as Hypergraphs*, **Toronto Metropolitan University, Toronto, Canada**
- November 2022 *The 11th International Conference on Complex Networks and their Applications*, **Palermo, Italy**
- November 2021 *The 10th International Conference on Complex Networks and their Applications*, **Madrid, Spain**
- December 2020 *The 9th International Conference on Complex Networks and their Applications*, **Madrid, Spain**

– September 2020 (co-organizer) *The 17th Workshop on Algorithms and Models for the Web Graph (WAW 2020)*, **SGH Warsaw School of Economics, Warsaw, Poland**

– May 2020 *The 14th Latin American Theoretical Informatics Symposium (LATIN 2020)*, **São Paulo, Brasil**

– February 2020 (co-organizer) *Blockchain Technology Symposium (BTS 2020)*, **The Fields Institute for Research in Mathematical Science, Toronto, ON, Canada**

– January 2020 (co-organizer and lecturer) *Workshop on Hypergraphs—Theory and Applications*, **The Fields Institute for Research in Mathematical Science, Toronto, ON, Canada**

– December 2019 *The 8th International Conference on Complex Networks and their Applications*, **Lisbon, Portugal**

– November 2019 (co-organizer and lecturer) *Workshop on Hypergraph Modelling*, **Universitá degli Studi di Salerno, Salerno, Italy**

– August 2019 (co-organizer and lecturer) *Summer School on Data Science Tools and Techniques in Modelling Complex Networks*, **The Fields Institute for Research in Mathematical Science, Toronto, ON, Canada**

– August 2019 (co-organizer) *Graph Searching in Canada (GRASCan) Workshop 2019*, **The Fields Institute for Research in Mathematical Science, Toronto, ON, Canada**

– July 2019 (co-organizer) *The 16th Workshop on Algorithms and Models for the Web Graph (WAW 2019)*, **The University of Queensland, Brisbane, Australia**

– May 2019 *The 7th Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM 2019)*, **SFU, Vancouver, Canada**

– September 2018 (co-organizer) *Blockchain Technology — from Hype to Reality*, **The Fields Institute for Research in Mathematical Science, Toronto, ON, Canada**

– May 2018 (co-organizer) *The 15th Workshop on Algorithms and Models for the Web Graph (WAW 2018)*, **MIPT, Moscow, Russia**

– May 2018 (co-organizer) *Workshop on graphs, networks, and their applications*, **MIPT, Moscow, Russia**

– October 2017 (co-organizer) *Ada Lovelace Day*, **The Fields Institute for Research in Mathematical Science, Toronto, ON, Canada**

– August 2017 (organizer of a Special Session in Industrial Mathematics) *The IV AMMCS International Conference*, **Waterloo, Canada**

– June 2017 (co-organizer) *Workshop on Random Geometric Graphs and Their Applications to Complex Networks*, **The Fields Institute for Research in Mathematical Science, Toronto, ON, Canada**

– June 2017 (co-organizer) *The 14th Workshop on Algorithms and Models for the Web Graph (WAW 2017)*, **The Fields Institute for Research in Mathematical Science, Toronto, ON, Canada**

– June 2017 (co-organizer) *Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM 2017)*, **Ryerson University, Toronto, ON, Canada**

– May-June 2017 (co-organizer) *Summer School on Random Graphs and Probabilistic Methods*, **The Fields Institute for Research in Mathematical Science, Toronto, ON, Canada**

– May-June 2017 (co-organizer) The Focus Program on *Random Graphs and their Applications to Complex Networks*, **The Fields Institute for Research in Mathematical Science, Toronto, ON, Canada**

– December 2016 (co-organizer) *The 13th Workshop on Algorithms and Models for the Web Graph (WAW 2016)*, **Centre de Recherches Mathematiques, Montreal, QC, Canada**

– November 2016 (co-organizer) *Random Geometric Graphs and Their Applications to Complex Networks*, **Banff International Research Institute, Banff, AB, Canada**

– December 2015 *The 12th Workshop on Algorithms and Models for the Web Graph (WAW 2015)*, **EURANDOM, Eindhoven, Netherlands**

– September 2015 (co-organizer) *Cargese Fall School on Random Graphs*, **Cargese, Corsica**

– June 2015 (organizer of invited minisymposium on random graphs) *The 5th biennial Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM)*, **Saskatoon, SK, Canada**

– December 2014 (co-organizer) *The 11th Workshop on Algorithms and Models for the Web Graph (WAW 2014)*, **Beijing, China**

– December 2013 (co-organizer) *The 10th Workshop on Algorithms and Models for the Web Graph (WAW 2013)*, **Harvard University, Cambridge, MA, USA**

– April 2013 (co-organizer) *The 2nd Graph Searching in Canada (GRASCan) Workshop*, **Ryerson University, Toronto, ON, Canada**

– October 2012 (co-organizer) *The 5th Workshop on Graph Searching, Theory and Applications (GRASTA 2012)*, **Banff International Research Institute, Banff, AB, Canada**

– June 2012 *The 9th Workshop on Algorithms and Models for the Web Graph (WAW 2012)*, **Dalhousie University, Halifax, NS, Canada**

– May 2012 (co-organizer) *The 1st Graph Searching in Canada (GRASCan) Workshop*, **Ryerson University, Toronto, ON, Canada**

– December 2011 (session co-organizer) *Canadian Mathematical Society Winter Meeting Session on Complex Networks*, **Ryerson University, Toronto, ON, Canada**

– May 2011 (co-organizer) *The 8th Workshop on Algorithms and Models for the Web Graph (WAW 2011)*, **Emory University, Atlanta, GA, USA**

– August 2007 (local arrangements chair) *The 4th Workshop on Combinatorial and Algorithmic Aspects of Networking (CAAN 2007)*, **Dalhousie University, Halifax, NS, Canada**

– December 2006 *The 4th Workshop on Algorithms and Models for the Web-Graph (WAW2006)*, **Banff International Research Institute, Banff, AB, Canada**

SELECTED INVITATIONS (SINCE 2015)

– March 2024, *18th Annual Workshop on Probability, Combinatorics, and Geometry*, **McGill University's Bellairs Institute, Barbados**

– June 2023, *8th Gdańsk Workshop on Graph Theory (GWGT)*, **Sopot, Poland**

– April 2023, *17th Annual Workshop on Probability, Combinatorics, and Geometry*, **McGill University's Bellairs Institute, Barbados**

– March 2023, *Random Graphs: Combinatorics, Complex Networks and Disordered Systems*, **The Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany**

– September 2022, *International Conference on Recent Advancements in Graph Theory – 2022*, **Gujarat University, India (virtual)** (plenary speaker)

– March 2022, *16th Annual Workshop on Probability, Combinatorics, and Geometry*, **McGill University's Bellairs Institute, Barbados**

– October 2021, *39th Conference "Operation Research — Methods and Applications"*, **Będlewo, Poland** (keynote speaker)

– October 2021, Fall School on *Mining Complex Networks*, **Gdańsk University of Technology, Gdańsk, Poland**

– January 2021, Special session on Applied Combinatorial Methods and on Combinatorial Approaches to Topological Structures and Applications, at the *2021 Joint Mathematics Meeting*, **virtual** (formerly in **Washington, DC, USA**)

– October 2020, Special session on Random Discrete Structures at the *AMS Fall Southeastern Sectional Meeting*, **virtual** (formerly at **University of Tennessee at Chattanooga, TN, USA**)

– September 2020, *Probabilistic Combinatorics Online 2020*, **virtual** (plenary speaker)

– July 2020, *Recent Trends in Mathematics and Its Applications to Graphs, Networks and Petri Nets – ICRTMA-GPN-2020*, **JNU, New Delhi, India** (keynote speaker)

– May 2020, *Random Graphs: Combinatorics, Complex Networks and Disordered Systems*, **Oberwolfach Research Institute for Mathematics, Oberwolfach-Walke, Germany** (event cancelled)

– March 2020, *AMS Sectional Meeting, Special Session on Random Discrete Structures*, **Tufts University, Medford, MA, USA** (invited speaker, event cancelled)

– September 2019, *AMS Fall Sectional Meeting, Special Session on Extremal Graph Theory*, **University of Wisconsin-Madison, Madison, WI, USA** (invited speaker)

– July 2019, *Summer School on Algorithms and Data Structures*, **Gdansk University of Technology, Gdansk, Poland** (invited mini-course on randomized algorithms)

– June 2019, *International Conference on Graph Theory, Combinatorics and Applications*, **National Sun Yat-sen University, Kaohsiung, Taiwan** (invited speaker)

– May 2019, Three invited minisymposia (on Random Graphs, Computational methods in industrial mathematics, and Graph Searching), *The 7th Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM 2019)*, **SFU, Vancouver, Canada**

– April 2019, *IPM Combinatorics and Computing Conference 2019 (IPMCCC2019)*, **Research in Fundamental Sciences (IPM), Tehran, Iran** (plenary speaker)

– April 2019, *14th Annual Workshop on Probability, Combinatorics, and Geometry*, **McGill University's Bellairs Institute, Barbados**

– October 2018, Special session on Probabilistic Methods in Combinatorics, *AMS Sectional Meeting*, **University of Michigan, Ann Arbor, MI, USA**

– September 2018, *7th Polish Combinatorial Conference*, **Bedlewo, Poland** (plenary speaker)

– July 2018, *Summer School on Algorithms and Data Structures*, **Gdansk University of Technology, Gdansk, Poland** (invited mini-course on randomized algorithms)

– July 2018, *6th Gdansk Workshop on Graph Theory*, **Gdansk, Poland** (invited talk)

– May 2018, *Workshop on graphs, networks, and their applications*, **MIPT, Moscow, Russia** (keynote speaker)

– May 2018, **Warsaw School of Economics, Warsaw, Poland** (invited mini-course on randomized algorithms)

– April 2018, *13th Annual Workshop on Probability, Combinatorics, and Geometry*, **McGill University's Bellairs Institute, Barbados**

– July 2017, **Universite de Nice Sophia-Antipolis, Nice, France** and **INRIA Sophia Antipolis, France**

– May 2017, **Zhejiang Normal University, Jinhua, China**

– April 2017, *12th Annual Workshop on Probability, Combinatorics, and Geometry*, **McGill University's Bellairs Institute, Barbados**

– July 2016, *Graph Searching in Canada (GRASCan) Workshop 2016*, **Dalhousie University, Halifax, NS, Canada** (plenary speaker)

– June 2016, **Yandex, Moscow, Russia**

– June 2016, *2016 SIAM Conference on Discrete Mathematics, invited minisymposium on "Random Discrete Structures" and on "Cops and Robbers and Pursuit-Evasion in Discrete Structures"*, **GSU, Atlanta, Georgia, USA**

– May 2016, **Zhejiang Normal University, Jinhua, China**

– April 2016, *11th Annual Workshop on Probability, Combinatorics, and Geometry*, **McGill University's Bellairs Institute, Barbados**

– December 2015, *International Conference on Graph Theory and Its Applications*, **Coimbatore, India** (plenary speaker)

– December 2015, *International Conference on Mathematical Computer Engineering – ICMCE2015*, **Chennai, India** (plenary speaker)

– October 2015, *AMS Sectional Meeting*, **University of Memphis, Memphis, TN, USA**

– June 2015, *Research Programme on Algorithmic Perspective in Economics and Physics*, **The Centre de Recerca Matemática, Barcelona, Spain**

– April 2015, *10th Annual Workshop on Probability, Combinatorics, and Geometry*, **McGill University's Bellairs Institute, Barbados**

– March 2015, *AMS Sectional Meeting*, **Michigan State University, East Lansing, MI, USA**

CONFERENCES, SEMINARS, WORKSHOPS (SINCE 2018)

Summary: 256 talks (2024 year–1, 2023–18, 2022–14, 2021–8, 2020–10, 2019–16, 2018–13, 2017–12, 2016–17, 2015–17, 2014–11, 2013–12, 2012–11, 2011–13, 2010–23, 2009–15, 2008–18, 2007–9, 2006–11, 2005–4, 2004–1, 2003–1, 2002–1)

– February 2024 (speaker), *Graphs @ TMU Group Seminar*, **Toronto Metropolitan University, Toronto, ON, Canada**, title of talk: *Random Matching Markets*

– December 2023 (speaker), *MMD Seminar*, **Simons Laufer Mathematical Sciences Institute, Berkeley, CA, USA**, title of talk: *Random Matching Markets*

– December 2023 (speaker), *Graph Limits and Processes on Networks Reunion*, **The Simons Institute for the Theory of Computing, UC Berkeley, CA, USA**, title of talk: *Cliques, Chromatic Number, and Independent Sets in the Semi-random Process*

– November 2023 (speaker), *MMD Seminar*, **Simons Laufer Mathematical Sciences Institute, Berkeley, CA, USA**, title of talk: *Semi-random process*

– November 2023 (speaker), *Network Science Seminar*, **Simons Laufer Mathematical Sciences Institute, Berkeley, CA, USA**, title of talk: *Graph Embeddings*

– October 2023 (speaker), *Graphs @ TMU Group Seminar*, **Toronto Metropolitan University, Toronto, ON, Canada**, title of talk: *The Erdős-Gyárfás function $f(n,4,5)=\frac{5}{6}n+o(n)$ — so Gyárfás was right*

– October 2023 (speaker), *IPM seminar*, **Isfahan, Iran**, title of talk: *The Erdős-Gyárfás function $f(n,4,5)=\frac{5}{6}n+o(n)$ — so Gyárfás was right*

– June 2023 (speaker), *8th Gdańsk Workshop on Graph Theory (GWGT)*, **Sopot, Poland**, title of talk: *Analyzing algorithms using the differential equation method (3h tutorial)*

– June 2023 (speaker), *8th Gdańsk Workshop on Graph Theory (GWGT)*, **Sopot, Poland**, title of talk: *The Erdős-Gyárfás function $f(n,4,5)=\frac{5}{6}n+o(n)$ — so Gyárfás was right*

– June 2023 (speaker), *The Social Networks and Complex Systems Workshop*, **SGH Warsaw School of Economics, Warsaw, Poland**, title of talk: *The Erdős-Gyárfás function $f(n,4,5)=\frac{5}{6}n+o(n)$ — so Gyárfás was right*

– June 2023 (speaker), *The Social Networks and Complex Systems Workshop*, **SGH Warsaw School of Economics, Warsaw, Poland**, title of talk: *Graph Embeddings*

– May 2023 (speaker), *18th Workshop on Algorithms and Models for the Web Graph (WAW2023)*, **Fields Institute for Research in Mathematical Sciences, Toronto, Canada**, title of talk: *Graph Embeddings and Their Unsupervised Evaluation*

– May 2023 (speaker), *Workshop on Modelling and Mining Complex Networks as Hypergraphs*, **Toronto Metropolitan University, Toronto, Canada**, title of talk: *Modularity Based Community Detection in Hypergraphs*

– March 2023 (speaker), *Random Graphs: Combinatorics, Complex Networks and Disordered Systems*, **The Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany**, title of talk: *The Erdős-Gyárfás function* $f(n, 4, 5) = \frac{5}{6}n + o(n)$ *— so Gyárfás was right*

– March 2023 (speaker), *New York Combinatorics Seminar*, **CUNY, New York, NY, USA**, title of talk: *Semi-random process*

– January 2023 (speaker), *Winter 2023 Virtual Graph Searching research meeting* (virtual), title of talk: *Semi-random process*

– January 2023 (speaker), *Data Science seminar*, **Thompson Rivers University, Kamloops, BC, Canada** (virtual), title of talk: *An Unsupervised Framework for Comparing Graph Embeddings*

– January 2023 (speaker), *Atlantic Graph Theory seminar*, **Dalhousie University, Halifax, NS, Canada** (virtual), title of talk: *An Unsupervised Framework for Comparing Graph Embeddings*

– January 2023 (speaker), *infoDIGITAL seminar*, **SGH Warsaw School of Economics, Warsaw, Poland** (virtual), title of talk: *An Unsupervised Framework for Comparing Graph Embeddings*

– December 2022 (speaker), *Graph Limits and Processes on Networks: From Epidemics to Misinformation*, **UC Berkeley, CA, USA**, title of talk: *An Unsupervised Framework for Comparing Graph Embeddings*

– November 2022 (speaker), *Discrete Mathematics Seminar*, **Alzahra University, Tehran, Iran (virtual)**, title of talk: *Semi-random process*

– November 2022 (speaker), *11th International Conference on Complex Networks and their Applications*, **Palermo, Italy**, title of talk: *Modularity of the ABCD Random Graph Model with Community Structure*

– November 2022 (speaker), *11th International Conference on Complex Networks and their Applications*, **Palermo, Italy**, title of talk: *Outliers in the ABCD Random Graph Model with Community Structure (ABCD+o)*

– September 2022 (plenary speaker), *International Conference on Recent Advancements in Graph Theory – 2022*, **Gujarat University, India (virtual)**, title of talk: *Applying random graph models in building machine learning algorithms*

– June 2022 (speaker), *CMS Summer 2022 Meeting*, **Memorial University of Newfoundland, St. John's, NL, Canada**, title of talk: *Edge and Pair Queries—Random Graphs and Complexity*

– May 2022 (invited speaker), *International Workshop on Extremal Combinatorics*, **virtual** — organized by **Isfahan-Branch of the Institute for Research in Fundamental Sciences, Isfahan, Iran**, title of talk: *Semi-random process*

– April 2022 (speaker), *Combinatorics Seminar*, **University of Chile, Santiago, Chile**, title of talk: *Semi-random process*

– April 2022 (speaker), *IMC Seminar*, **Pontificia Universidad Católica de Chile, Santiago, Chile**, title of talk: *Applying random graph models in building machine learning algorithms*

– March 2022 (speaker), *Cultural Center Hofstra*, **Hofstra University, Hempstead, NY, USA**, title of talk: *Applying random graph models in building machine learning algorithms*

– March 2022 (speaker), *Math Department Seminar*, **Hofstra University, Hempstead, NY, USA**, title of talk: *Semi-random process*

– March 2022 (speaker), *Graphs @ Ryerson Group Seminar*, **Ryerson University, Toronto, ON, Canada**, title of talk: *Semi-random process*

– February 2022 (speaker), *University of Manitoba Colloquium*, **virtual**, title of talk: *Applying random graph models in building machine learning algorithms*

– January 2022 (speaker), *Graph Searching Online Seminar 2021*, **virtual**, title of talk: *Semi-random process*

– December 2021 (speaker), *Combinatorics seminar at CombGeo lab at MIPT*, **virtual** (**MIPT, Moscow, Russia**), title of talk: *Semi-random process*

– November 2021 (speaker), *10th International Conference on Complex Networks and their Applications*, **virtual** (**Madrid, Spain**), title of talk: *A Multi-purposed Unsupervised Framework for Comparing Embeddings of Undirected and Directed Graphs*

– November 2021 (speaker), *Groningen Stochastics Seminar*, **virtual** (**Groningen, Groningen, The Netherlands**), title of talk: *Semi-random process*

– October 2021 (keynote speaker), *39th Conference "Operation Research — Methods and Applications"*, **Będlewo, Poland**, title of talk: *Applying random graph models in building machine learning algorithms*

– July 2021 (speaker), *Comnet @ Networks 2021: A Joint Sunbelt and NetSci Conference*, **virtual**, title of talk: *A parallelized implementation of Artificial Benchmark for Community Detection (ABCD) graphs generator— ABCDe*

– April 2021 (speaker), *Department of Computer Science Colloquium*, **Rochester Institute of Technology, Rochester, NY, USA**, title of talk: *An Unsupervised Framework for Comparing Graph Embeddings*

– January 2021 (invited speaker), Special session on Applied Combinatorial Methods, at the *2021 Joint Mathematics Meeting*, **virtual** (formerly in **Washington, DC, USA**), title of talk: *An Unsupervised Framework for Comparing Graph Embeddings*

– January 2021 (invited speaker), Special session on Combinatorial Approaches to Topological Structures and Applications, at the *2021 Joint Mathematics Meeting*, **virtual** (formerly in **Washington, DC, USA**), title of talk: *Community Detection Algorithm Using Hypergraph Modularity*

– December 2020 (invited speaker), Mathematics Public Lecture, virtual (organized by IPM-Isfahan, Iran), title of talk: *A variant of the Erdős-Rényi random graph process*

– October 2020 (speaker), *Graphs @ Ryerson Group Seminar*, **Ryerson University, Toronto, ON, Canada**, title of talk: *A Scalable Unsupervised Framework for Comparing Graph Embeddings*

– October 2020 (invited speaker), Special session on Random Discrete Structures at the *AMS Fall Southeastern Sectional Meeting*, **virtual** (formerly at **University of Tennessee at Chattanooga, TN, USA**), title of talk: *A variant of the Erdős-Rényi random graph process*

– September 2020 (plenary speaker), *Probabilistic Combinatorics Online 2020*, **virtual**, title of talk: *Localization Game for Random Graphs*

– September 2020 (speaker), *Workshop on Hypergraph Modelling and the 17th Workshop on Algorithms and Models for the Web Graph (WAW 2020)*, **virtual**, title of talk: *A Scalable Unsupervised Framework for Comparing Graph Embeddings*

– July 2020 (keynote speaker), *Recent Trends in Mathematics and Its Applications to Graphs, Networks and Petri Nets – ICRTMA-GPN-2020*, **JNU, New Delhi, India**, title of talk: *Clustering via Hypergraph Modularity*

– May 2020 (speaker), *GT&C Seminar*, **University of Illinois, Urbana-Champaign, IL, USA**, title of talk: *A variant of the Erdős-Rényi random graph process*

– April 2020 (speaker), *Departmental Seminar*, **Technical University of Łódź, Łódź, Poland**, title of talk: *Clustering via Hypergraph Modularity*

– April 2020 (speaker), *New York Combinatorics Seminar*, **CUNY, New York, NY, USA**, title of talk: *A variant of the Erdős-Rényi random graph process*

– March 2020 (speaker), **St. Thomas Aquinas Secondary School, Brampton, ON, Canada**, title of talk: *Massive agent-based simulations of intelligent transportation systems*

– November 2019 (speaker), *Graph Theory Seminar*, **Simon Fraser University, Vancouver, BC, Canada**, title of talk: *Localization Game for Random Graphs*

– November 2019 (speaker), *Graphs @ Ryerson Group Seminar*, **Ryerson University, Toronto, ON, Canada**, title of talk: *Localization Game for Random Graphs*

– November 2019 (speaker), *Workshop on Hypergraph Modelling*, **University of Salerno, Italy**, title of talk: *Algorithms for hypergraph modularity optimization*

– September 2019 (speaker), *Analytics Academy Seminar*, **Sun Life Financial, Toronto, ON, Canada**, title of talk: *Massive agent-based simulations of intelligent transportation systems*

– September 2019 (speaker), *Waterloo Coloring Conference 2019*, **University of Waterloo, Waterloo, ON, Canada**, title of talk: *Clique colouring of binomial random graphs and geometric graphs*

– September 2019 (speaker), *AMS Fall Sectional Meeting, Special Session on Extremal Graph Theory*, **University of Wisconsin-Madison, Madison, WI, USA**, title of talk: *Clique colouring of binomial random graphs and geometric graphs*

– July 2019 (speaker), *19th International Conference on Random Structures and Algorithms*, **ETH, Zurich, Switzerland**, title of talk: *A variant of the Erdős-Rényi random graph process*

– July 2019 (speaker), *7th Gdansk Workshop on Graph Theory*, **Gdansk, Poland**, title of talk: *Zero Forcing Number of Random Regular Graphs*

– June 2019 (invited speaker), *International Conference on Graph Theory, Combinatorics and Applications*, **National Sun Yat-sen University, Kaohsiung, Taiwan**, title of talk: *k-regular Subgraphs Near the k-core Threshold of a Random Graph*

– June 2019 (speaker), *Combinatorics Seminar*, **National Sun Yat-sen University, Kaohsiung, Taiwan**, title of talk: *Graph Searching Games and Probabilistic Methods*

– June 2019 (speaker), *Data Science Lab Seminar*, **Ryerson University, Toronto, ON, Canada**, title of talk: *Clustering via Hypergraph Modularity*

– May 2019 (speaker at invited minisymposium on Random Graphs), *The 7th Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM 2019)*, **SFU, Vancouver, Canada**, title of talk: *k-regular Subgraphs Near the k-core Threshold of a Random Graph*

– May 2019 (speaker at invited minisymposium on Computational methods in industrial mathematics), *The 7th Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM 2019)*, **SFU, Vancouver, Canada**, title of talk: *Clustering via Hypergraph Modularity*

– May 2019 (speaker at minisymposium on Graph Searching), *The 7th Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM 2019)*, **SFU, Vancouver, Canada**, title of talk: *Zero Forcing Number of Random Regular Graphs*

– April 2019 (invited speaker) *IPM Combinatorics and Computing Conference 2019 (IPMCCC2019)*, **Research in Fundamental Sciences (IPM), Tehran, Iran**, title of talk: *Thresholds in random graphs with focus on thresholds for k-regular subgraphs*

– March 2019 (speaker) *New York Combinatorics Seminar*, **CUNY, New York, NY, USA**, title of talk: *Thresholds in random graphs with focus on thresholds for k-regular subgraphs*

– January 2019 (invited speaker) *MS2 Discovery Institute Seminar Series*, **Wilfrid Laurier University, Waterloo, ON, Canada**, title of talk: *Clustering via Hypergraph Modularity*

– November 2018 (speaker) *Graphs @ Ryerson Group Seminar*, **Ryerson University, Toronto, ON, Canada**, title of talk: *Sicherman dice*

– October 2018 (speaker) *Graphs @ Ryerson Group Seminar*, **Ryerson University, Toronto, ON, Canada**, title of talk: *k-regular Subgraphs Near the k-core Threshold of a Random Graph*

– September 2018 (invited speaker) *7th Polish Combinatorial Conference*, **Bedlewo (near Poznan), Poland**, title of talk: *k-regular Subgraphs Near the k-core Threshold of a Random Graph*

– July 2018 (speaker), *Summer School on Algorithms and Data Structures*, **Gdansk University of Technology, Gdansk, Poland**, title of talk: *Randomized Algorithms* (series of 6 lectures)

– July 2018 (invited speaker), *6th Gdansk Workshop on Graph Theory*, **Gdansk University of Technology, Gdansk, Poland**, title of talk: *Graph Searching Games and Probabilistic Methods*

– June 2018 (speaker) *Working Lunch Seminar*, **The Fields Institute for Research in Mathematical Sciences, Toronto, Canada**, title of talk: *Modularity of complex networks models*

– May 2018 (invited speaker) *Workshop on graphs, networks, and their applications*, **MIPT, Moscow, Russia**, title of talk: *k-regular Subgraphs Near the k-core Threshold of a Random Graph*

– May 2018 (speaker) *Combinatorics Seminar*, **Warsaw University of Technology, Warsaw, Poland**, title of talk: *Graph Searching Games and Probabilistic Methods*

– May 2018 (speaker) *Seminar of the Decision Analysis and Support Unit*, **Warsaw School of Economics, Warsaw, Poland**, title of talk: *Randomized Algorithms* (series of 4 lectures)

– May 2018 (speaker) *Seminar of the Decision Analysis and Support Unit*, **Warsaw School of Economics, Warsaw, Poland**, title of talk: *Modularity of complex networks models*

– April–May 2018 (speaker) *Graphs @ Ryerson Group Seminar*, **Ryerson University, Toronto, ON, Canada**, title of talk: *Randomized Algorithms* (series of 4 lectures)

– March 2018 (speaker) *Department of Mathematics Colloquium*, **Montclair State University, Montclair, NJ, USA**, title of talk: *Graph Searching Games and Probabilistic Methods*

– March 2018 (speaker) *Graphs @ Ryerson Group Seminar*, **Ryerson University, Toronto, ON, Canada**, title of talk: *Graph Searching Games and Probabilistic Methods*

EXTERNAL REFEREEING

– Managing Editor of the journal Internet Mathematics (2021–2023)

– Member of NSF Grant Panel, NSF, Washington (2012 and 2016)

– Member of the College of Reviewers for Ontario Centre of Excellence (2015–2022)

– Grant reviews: NSERC (DG, CRD, PGS, and CRC programs), Mitacs Accelerate internships, Austrian Science Fund, The National Security Agency (NSA), The Netherlands Organisation for Scientific Research (NWO), Banff International Research Station, Fields Institute for Research in Mathematical Sciences, Polish National Science Centre (NCN)

375 research papers

– Journals: Advances in Applied Mathematics, Advances in Applied Probability, Annals of Applied Probability, Annals of Combinatorics, Annals of Probability, Applied Probability, Ars Combinatoria, Australasian Journal of Combinatorics, Bulletin of the Malaysian Mathematical Sciences Society, Canadian Mathematical Society, Central European Journal of Mathematics, Combinatorica, Combinatorics Probability and Computing, Communications of the ACM, Computers & Operations Research, Contributions to Discrete Mathematics, Discrete Applied Mathematics, Discrete Mathematics, Discrete Mathematics & Theoretical Computer Science, Discussiones Mathematicae Graph Theory, Dynamic Games and Applications, Electronic Communications in Probability, Electronic Journal of Combinatorics, European Journal of Combinatorics, Fundamenta Informaticae, Graphs and Combinatorics, IJCAET, IJKCDT, Information Processing Letters, Integers, International Journal of Computational Geometry and Applications, Internet Mathematics, Journal of

Advances in Applied Probability, Journal of Combinatorial Optimization, Journal of Combinatorial Theory, Series B, Journal of Combinatorics, Journal of Complex Networks, Journal of Computer and System Sciences, Journal of Graph Theory, Journal of Statistical Physics, Journal of the Association for Computing Machinery, Mathematics Nature, Network Science, Networks, Opuscula Mathematica, Physica A, PLOS ONE, Probability and Mathematical Statistics, Proceedings of the American Mathematical Society, Proceedings of the National Academy of Sciences, Random Structures and Algorithms, SIAM Journal on Discrete Mathematics, SIAM Journal on Mathematics of Data Science, Social Network Analysis and Mining, Statistics and Probability Letters, Transactions on Network Science and Engineering, The Annals of Probability, Theoretical Computer Science

– Proceedings: ITCS 2024, Complex Networks 2023, WAW2023, Complex Networks 2022, Complex Networks 2021, Complex Networks 2020, WAW2020, Latin 2020, SODA2020, Complex Networks 2019, WAW2019, SODA2019, ISCO2018, WAW2018, RANDOM2017, WAW2017, SODA2017, WAW2016, ISAAC 2015, SIROCCO2015, WAW2015, Lagos2015, WAW2014, CCCG2014, RANDOM2014, IROS2014, CCECE2014, FAW2014, WAW2013, ESA2013, SODA2013, ESA2012, WAW2012, SODA2012, WAW2011, LATIN2010, HT2009, CAAN2007, WAW2006, AI-2006, ICALP2006, ALENEX05, CAAN2005, SODA05

– AMS Mathematical Reviews (including one book)

– CRC Press (one book)

TEACHING EXPERIENCE

* Toronto Metropolitan University (formerly Ryerson University), Toronto, ON, Canada

  – AM8204/AM9001 – Topics in Discrete Mathematics, W19, W20, W23 (3x)
  – AM8208 – Topics in Mathematics, W12
  – AM8208 – Probabilistic Method and Random Graphs, F22
    (the course was included in the Fields Academy Shared Graduate Courses and offered to students from other universities)
  – AM8002 – Discrete Mathematics and its Applications, F13, F15, F20 (3x)
  – DS8014/AM8208 – Mining Complex Networks, F21
    (the course was included in the Fields Academy Shared Graduate Courses and offered to students from other universities)
  – DS8014 – Graph Mining, F20, F21, F22 (3x)
  – MTH607 – Graph Theory, W12, W13, W15, W16, W17, W21 (6x)
  – MTH410 – Statistics, W19
  – MTH314 – Discrete Mathematics for Engineers, W13, W14, W18, W20, W21, W23 (6x)
  – MTH110 – Discrete Mathematics I, F12, F16, F18, F19 (4x)

* Memorial University of Newfoundland, St. John's, NL, Canada

  – Probabilistic Method and Random Graphs (the eleventh annual Summer School of the Atlantic Association for Research in the Mathematical Sciences (AARMS)), S12

* West Virginia University, Morgantown, WV, USA

  – MATH 791L – Markov Chains and Mixing Times, S11
  – MATH 773 – Probabilistic method and random graphs, F10
  – MATH 283 – Introduction to the Concepts of Mathematics, F09, F10 (2x)
  – MATH 571 – Combinatorial Analysis, S10
  – MATH 261 – Elementary Differential Equations, S10

* Dalhousie University, Halifax, NS, Canada

- MATH/ECON 3700 – Mathematics for Economists, F08
- MATH/CSCI 2112 – Discrete Structures I, F07, F08 (2x)
- MATH 4330/5330, CSCI 4115 – Topics in Graph Theory, F06

* University of Waterloo, Waterloo, ON, Canada

- MATH 118 – Calculus 2 for Engineering, S06
- MATH 116 – Calculus for Engineering, F05

* Adam Mickiewicz University, Poznań, Poland

- Algorithms and Data Structures
- Discrete Mathematics
- Object Oriented Programming in C++
- Image Processing
- Numerical Methods
- Programming in C

STUDENT / POST-DOC PROJECTS SUPERVISED

Post-doc

105. Austin Eide, 2023-24, TMU (Toronto Metropolitan University, Toronto, ON, Canada)

104. Jordan Barrett, **Modelling and Mining Complex Networks as Hypergraphs**, 2023-24, TMU - Tutte Institute for Mathematics and Computing

103. JD Nir, 2022-23, TMU

102. Ryan Cushman, 2021-22, Ryerson (Ryerson University, Toronto, ON, Canada)

101. Natalie Behague, 2020-21, Ryerson

100. Mahsa Kazeminooreddinvand, **COVID-19: Agent-based framework for modelling pandemics in urban environment**, 2021, Ryerson – NSERC Alliance

99. Trent Marbach, 2019-21, Ryerson

98. William Kay, **Improved transductive regression using interconnected data**, 2019, Ryerson – Mitacs Accelerate

97. Sean English, 2018-19, Ryerson

96. Przemysław Szufel,
a) **Secure and Smart Connected Cars**, 2018-20, Ryerson – NXM + Fields-CQAM
b) **Online Detection of Users' Anomalous Activities on Confidential File Sharing Platform**, 2018-19, Ryerson – NSERC Engage Project
c) **Agent-based simulation modelling of out-of-home advertising viewing opportunity**, 2018, Ryerson – OCE VIP1

95. Hoda Chuangpishit, 2017-18, Ryerson

94. Ceni Babaoglu, **Cognitive Claims AI**, 2017, Ryerson – NSERC Engage

93. Ewa Infeld, 2016-17, Ryerson

92. Dieter Mitsche,
a) **Modelling of Homophily and Social Influence via Random Graphs**, 2016-17, Ryerson – NSERC Engage
b) 2011-2012, Ryerson

91. Ben Reiniger, 2015-16, Ryerson

90. Xavier Perez-Gimenez,
a) **Hypergraph Theory and Applications**, 2015-16, Ryerson – TIMC project
b) 2014-15, Ryerson

89. T. Abdou, **Relationship Mapping Analytics for Fundraising and Sales Prospect Research**, 2015-16, Ryerson – NSERC Engage

88. Z. Noorian, **Web Visitor Engagement Measurement and Maximization**, 2014-15, Ryerson – OCE Talent Edge Fellowship Program

87. F. Firouzi,
a) **Web Visitor Engagement Measurement and Maximization**, 2014-15, Ryerson – OCE Talent Edge Fellowship Program
b) **Utilizing big data for business-to-business matching and recommendation system**, 2014-15, Ryerson – NSERC Engage

86. Tommaso Traetta, 2014-15, Ryerson

85. Bora Caglayan,
a) **A self-organizing dynamic network model increasing the efficiency of outdoor digital billboards**, 2014, Ryerson – NSERC Engage
b) **Exploiting Big Data for Customized Online News Recommendation System**, 2014, Ryerson – NSERC Engage
c) **Personalized Mobile Recommender System**, 2013-2014, Ryerson – NSERC Engage

84. Deepak Bal, 2013-14, Ryerson

83. Marek Lipczak,
a) **Personalized Mobile Recommender System**, 2013-14, Ryerson – NSERC Engage
b) **Dynamic clustering and prediction of taxi service demand**, 2012, Ryerson – NSERC Engage

82. William Kinnersley, 2012-2014, Ryerson

81. Y. Hu, **Intelligent Rating System**, 2012-2013, Ryerson – NSERC Engage

Ph.D.

80. Reaz Huq, **TBA**, 2021-?, Ryerson

79. Calum MacRury, **COVID-19: Agent-based framework for modelling pandemics in urban environment**, 2021, Ryerson – NSERC Alliance

78. Marek Antosiewicz, **Secure and Smart Connected Cars**, 2021, Ryerson – NXM + Fields-CQAM

77. Kinga Siuta,
a) **Detecting and Responding to Hostile Information Activities: unsupervised methods for measuring the quality of graph embeddings**, 2021-22, Ryerson — Patagona Technologies
b) **COVID-19: Agent-based framework for modelling pandemics in urban environment**, 2020-21, Ryerson – NSERC Alliance

76. Nykyta Polituchyi, **COVID-19: Agent-based framework for modelling pandemics in urban environment**, 2020-21, Ryerson – NSERC Alliance

75. Agata Skorupka,
a) **Detecting and Responding to Hostile Information Activities: unsupervised methods for measuring the quality of graph embeddings**, 2021-22, Ryerson — Patagona Technologies
b) **Secure and Smart Connected Cars**, 2020-21, Ryerson – NXM + Fields-CQAM

74. Brian Goncalves, **TBA**, 2020-?, Ryerson

73. Harjas Singh, **TBA**, 2020-?, Ryerson

72. Ash Dehghan,
a) **TBA**, 2020-?, Ryerson
b) **Detecting and Responding to Hostile Information Activities: unsupervised methods for measuring the quality of graph embeddings**, 2021-22, Ryerson — Patagona Technologies

71. Somnath Kundu,
a) **Study of problems involving mobile agents**, 2019-22, Ryerson
b) **Secure and Smart Connected Cars**, 2018-20, Ryerson – NXM + Fields-CQAM

70. Łukasz Krainski, **Secure and Smart Connected Cars**, 2018-20, Ryerson – NXM + Fields-CQAM

69. Marek Opalski, **Secure and Smart Connected Cars**, 2018-20, Ryerson – NXM + Fields-CQAM

68. Jacek Filipowski, **Secure and Smart Connected Cars**, 2018-20, Ryerson – NXM + Fields-CQAM

67. Tomasz Olczak,
a) **Improved transductive regression using interconnected data**, 2019, Ryerson – Mitacs Accelerate
b) **Automatic Personality Insights from Speech**, 2018-19, Ryerson – OCE VIP1

66. Bartosz Pankratz,
a) **Community Detection in Complex Networks—Synthetic Models and Algorithms Supported by Node Embeddings**, 2019-2022, Ryerson
b) **Secure and Smart Connected Cars**, 2018-20, Ryerson – NXM + Fields-CQAM
c) **Agent-based simulation modelling of out-of-home advertising viewing opportunity**, 2018, Ryerson – OCE VIP1

65. Ania Szczurek, **Agent-based simulation modelling of out-of-home advertising viewing opportunity**, 2018, Ryerson – OCE VIP1

64. C. Kavaklıoğlu, **Cognitive Claims AI**, 2017, Ryerson – NSERC Engage

63. S. Akbarisanah, **Utilizing big data for business-to-business matching and recommendation system**, 2014-15, Ryerson – NSERC Engage

62. Parisa Lak,
a) **Utilizing big data for business-to-business matching and recommendation system**, 2014-15, Ryerson – NSERC Engage
b) **A self-organizing dynamic network model increasing the efficiency of outdoor digital billboards**, 2014, Ryerson – NSERC Engage

61. F. Nosrati, **A self-organizing dynamic network model increasing the efficiency of outdoor digital billboards**, 2014, Ryerson – NSERC Engage

60. A. Samarikhalaj, **A self-organizing dynamic network model increasing the efficiency of outdoor digital billboards**, 2014, Ryerson – NSERC Engage

59. Abbas Mehrabian, **Dynamic clustering and prediction of taxi service demand**, 2012, Ryerson – NSERC Engage

58. Rory Wilson, **Dynamic clustering and prediction of taxi service demand**, 2012, Dal (Dalhousie University, Halifax, NS, Canada) – NSERC Engage

M.Sc.

57. Lourens Touwen, **Classical and Structural Embeddings of Networks and Their Applications in Various ML Tasks** (Mitacs Globalink Research Award), 2024, TMU

56. Lillian Gong, **Combining Graph Convolutional Networks and Generative Adversarial Networks for Robust Recommender Systems** (Major Research Project in Data Science), 2023, TMU

55. Akshat Dubey, **Detecting and Responding to Hostile Information Activities: unsupervised methods for measuring the quality of graph embeddings**, 2021-22, Ryerson — Patagona Technologies

54. Yuheng Zhao, **Identifying the Busiest Intersections in Markham Using Betweenness Centrality Method with Different Models** (Major Research Project in Data Science), 2021, Ryerson

53. Shams Naahid, **Identifying the Most Influential Nodes in Complex Networks Using Various Centrality Measures** (Major Research Project in Data Science), 2021, Ryerson

52. L. Tsang, **Predicting NBA Draft Candidates using College Statistics** (Major Research Project in Data Science), 2020, Ryerson

51. K. Varanovich, **Secure and Smart Connected Cars**, 2019, Ryerson – NXM + Fields-CQAM

50. Arash Dehghan,
a) **Embedding Complex Networks**, 2019-21, Ryerson
b) **Secure and Smart Connected Cars**, 2018-20, Ryerson – NXM + Fields-CQAM

49. Reaz Huq,
a) **Broadcasting on Paths, Cycles, and Cliques**, 2019-21, Ryerson
b) **Secure and Smart Connected Cars**, 2018-20, Ryerson – NXM + Fields-CQAM

48. K. Somisetty, **Online Detection of User's Anomalous Activities using Logs** (Major Research Project in Data Science), 2019, Ryerson

47. R. Natarajan, **Road Networks—Intersections and Traffic** (Major Research Project in Data Science), 2019, Ryerson

46. I. Barolia, **Synonym Detection with Knowledge Bases** (Major Research Project in Data Science), 2019, Ryerson

45. C. Postma, **Netflix Movie Recommendation Using Hybrid Learning Algorithms and Link Prediction** (Major Research Project in Data Science), 2019, Ryerson

44. Jacek Dziwisz, **Online Detection of Users' Anomalous Activities on Confidential File Sharing Platform**, 2018-19, Ryerson – NSERC Engage Project

43. Tomasz Zegota, **Automatic Personality Insights from Speech**, 2018-19, Ryerson – OCE VIP1

42. E. Tomini, **Load Forecasting using Recurrent Neural Networks in Ontario Energy Markets** (Major Research Project in Data Science), 2018, Ryerson

41. A. Amadou, **Geospatial Simulation and Modelling of Out-Of-Home Advertising Viewing Opportunity** (Major Research Project in Data Science), 2018, Ryerson

40. Tomasz Olczak, **Cognitive Claims AI**, 2017, Ryerson – NSERC Engage

39. Somnath Kundu, **Graph Theory Perspective of Stock Market Behaviour** (Major Research Project in Data Science), 2017, Ryerson

38. Vivija You, **Distance k cops and robbers, and graph cleaning**, 2011-13, Ryerson

37. Rory Wilson, **Properties of the Spatial Preferential Attachment Model**, 2008-2009, Dal

B.Sc.

36. Anton Sugolov, **COVID-19: Agent-based framework for modelling pandemics in urban environment**, 2020-21, Ryerson – NSERC Alliance

35. Reaz Huq, **Automatic Personality Insights from Speech**, 2018-19, Ryerson – OCE VIP1

34. Calum MacRury,
a) **Modelling Complex Networks Using Hypergraphs**, summer 2016, Ryerson – NSERC USRA
b) **Complex Networks and Modelling of Social Learning**, summer 2015, Ryerson – NSERC USRA
c) summer 2014, Ryerson

33. Bhargav Parsi, **Probabilistically Faulty Searching on a Half-Line**, summer 2016, Ryerson – MITACS Globalink Intern

32. Sophia Park, **Probabilistically Faulty Searching on a Half-Line**, summer 2016, Ryerson – Faculty of Science 2016 Summer URO

31. K. Ternovsky, **Hypergraph Theory and Applications**, 2015-16, Ryerson – TIMC project

30. Jake Nicolaidis, **Complex Networks and Modelling of Social Learning**, summer 2015, Ryerson – Faculty of Science 2015 Summer URO

29. Rita del Rio Chanona, **Complex Networks and Modelling of Social Learning**, summer 2015, Ryerson – MITACS Globalink Intern

28. G. Mousseau, **Intelligent Rating System**, 2012-2013, Ryerson – NSERC Engage

27. Y. Muc, **Intelligent Rating System**, 2012-2013, Ryerson – NSERC Engage

26. B. Fikree, **Intelligent Rating System**, 2012-2013, Ryerson – NSERC Engage

25. A. Bujnicka, **A Comparison of Sorting Algorithms**, 2007, AMU (Adam Mickiewicz University, Poznań, Poland)

24. T. Burdelak, **On-line Ramsey Numbers**, 2007, AMU

23. M. Andrzejczak, **Peer-to-Peer Networks**, 2006, AMU

22. M. Bednarczyk, **Lossless Data Compression Algorithms**, 2006, AMU

21. P. Gucwa, **Color Image Quantization Algorithms**, 2006, AMU

20. D. Maćkowiak, **Histogram Algorithms**, 2006, AMU

19. P. Matczak, **Hashing Tables**, 2006, AMU

18. D. Piorun, **Mathematical Models of the Web Graph**, 2006, AMU

17. Ł. Rachwalski, **Image Binarization**, 2006, AMU

16. M. Sobczak, **Self-balancing Binary Search Trees**, 2006, AMU

15. Ł. Soszyński, **Binary Trees**, 2006, AMU

14. M. Stadnicki, **Text Algorithms**, 2006, AMU

13. R. Szrama, **Image Files Structures**, 2006, AMU

12. M. Urban, **Fast Algorithms for Sorting**, 2006, AMU

11. T. Rybicki, **How to Build Supercomputer Using GNU/Linux Operating System?**, 2003, AMU

10. M. Kropiński, **Image Processing**, 2002, AMU

9. R. Mroziński, **Image Processing – Color Reduction in 24bit Images**, 2002, AMU

8. R. Opieliński, **Ising's Model**, 2002, AMU

7. P. Sobczak, **The Travelling Salesman Problem**, 2002, AMU

6. M. Szlawska, **MatLab Package and Its Applications in the 'Complex' Numerical Optimization Method**, 2002, AMU

5. T. Tomczyk, **Neural Networks**, 2002, AMU

4. R. Antczak, **Voronoi Trees and Its Application in Pointing Out the Diffusion Coefficient**, 2001, AMU

3. T. Kotala, **The Lempel–Ziv–Welch Compression Algorithm in Computer Simulations**, 2001, AMU

2. D. Parczyński, **The Huffman Compression Algorithm in Computer Simulations**, 2001, AMU

1. B. Stróżyńska, **Graph Theory and Its Application in Physics**, 2001, AMU

Ph.D. DEGREES EXAMINED

6. Mehrnoosh Javarsineh, **Graph Colouring and Decomposition**, 2023, Carleton (Carleton University, Ottawa, ON, Canada)

5. Ozan Ozyegen, **Local Interpretability Methods for Time Series Modeling**, 2022, TMU (Toronto Metropolitan University, Toronto, ON, Canada)

4. Trolliet Thibaud, **Study of the properties and modeling of complex social networks**, 2021, University of Nice-Sophia Antipolis (Nice, France)

3. A. Kadavankandy, **Spectral analysis of random graphs with application to clustering and sampling**, 2017, Inria (Inria, France)

2. J. Nastos, **Utilizing Graph Classes for Community Detection in Social and Complex Networks**, 2015, UBCO (UBC Okanagan, Kelowna, BC, Canada)

1. M.-E. Messinger, **Methods of Decontaminating Networks**, 2008, Dal (Dalhousie University, Halifax, NS, Canada)

MEMBERSHIPS IN PROFESSIONAL SOCIETIES

4. Canadian Mathematical Society (since 2014)

3. American Mathematical Society (since 2009)

2. Polish Mathematical Society (since 2009)

1. Association of Polish Engineers in Canada (2012–2023)