Brief CV Ilya Safro, Ph.D.

Computer and Information Sciences
University of Delaware
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Academic Employment

1/2021–now **University of Delaware, Department of Computer and Information Sciences**
- *Associate Chair for Graduate Studies and Research*
- *Associate Professor (tenured)*
- *Joint Associate Professor, Department of Physics and Astronomy*
- *Affiliated faculty, Data Science Institute*

8/2018–2020 **Clemson University**
Associate Professor (tenured), School of Computing

2/2015–2020 **Clemson University**
Faculty Scholar Professor, School of Health Research

8/2012–2018 **Clemson University**
Assistant Professor, School of Computing

11/2007–8/2012 **Argonne National Laboratory**, U.S. DoE laboratory managed by UChicago
Argonne Scholar, (2010–2012)
Postdoctoral appointment, (11/2007–2010)
Mathematics and Computer Science Division
The Laboratory for Advanced Numerical Simulations

2010–2012 **University of Chicago**
Joint research staff appointment, Computation Institute

1997–2007 **Research Associate and Research Assistant positions**
The Weizmann Institute of Science, Mathematics and Computer Science (2002-2007)
The Weizmann Institute of Science, Department of Structural Biology (1998-1999)
Ben-Gurion University, Communication Systems Engineering (1997-1998)

Education

2003–2008 *The Weizmann Institute of Science, Israel*
Ph.D. in Applied Mathematics and Computer Science
Field of research: multiscale methods, graph algorithms, machine learning, combinatorial scientific computing, optimization, network science, iterative methods, large-scale computations
Thesis: "Multilevel algorithms for combinatorial optimization problems"
Advisers: Prof. Achi Brandt, Dr. Dorit Ron

2001–2003 *The Weizmann Institute of Science, Israel*
M.Sc. in Applied Mathematics and Computer Science
Thesis: "The minimum linear arrangement problem"
Advisers: Prof. Achi Brandt, Prof. Uriel Feige

1995–1998 *Ben-Gurion University of Negev, Israel*
B.Sc. in Mathematics and Computer Science
Thesis: "Generalizations of the Hanoi towers problem"
Adviser: Prof. Daniel Berend

Research Interests

- ◇ quantum computing, hybrid quantum-classical algorithms and systems
- ◇ AI, machine learning, data mining
- ◇ network science, computational graph problems, discrete mathematics
- ◇ complex systems, multiscale methods
- ◇ natural language processing, text mining, automated hypothesis generation
- ◇ large-scale optimization
- ◇ scientific computing, computational science
- ◇ multiscale, multilevel and multigrid algorithms

Student Advising

Graduate Students and Postdocs (adviser and committee chair):

- ◇ One postdoc and 12 graduate students (see full CV; this list is not constantly updated here)

Graduate Students Committee Member:

- ◇ More than 12 students (see full CV; this list is not constantly updated here)

Thesis award achievements and honors programs in my lab at Clemson University:

- ◇ Justin Sybrandt (2016-2020), **Award: Outstanding PhD student in Computer Science** (now at Google Brain)
- ◇ Angelo Carrabba (2017-2018), Biomedical knowledge discovery and text mining, **Honors Thesis** (now at Google)
- ◇ M. Grace Glenn (2017-2018), Automated query generation for text streams in social media, **Honors Thesis** (now at Foursquare)
- ◇ Sloan Nietert (2016-2017), Algebraic multigrid methods for solving graph Laplacian linear systems, **Award: Dupont Best Undergraduate Project**
- ◇ Emmanuel John (2013-2014), Automatic hypothesis generation for biomedical text analysis, **Award: Dupont Best Undergraduate Project**

Visiting Students:

- ◇ Christian Staudt (Fall 2015, Karlsruhe Institute of Technology, Germany)

Students at Argonne National Laboratory:

- ◇ Four PhD students and one postdoc (see full CV for more info)

Teaching Experience

Examples of courses

- ◇ Principles of Scientific Computing, Selected Topics in Data Analysis, Foundations of Computer Science, Network Science, PhD Research Seminar, Linear Algebra

Honors and Awards

- ◇ 1998 Co-winner (with S. Benditkis) of B.Sc. final project competition; corresponding paper "Generalizations of the Hanoi Towers problem", arXiv, cs.DM/0612070, download
- ◇ 2002-2007 M.Sc, Ph.D. - The Weizmann Institute of Science Scholarships
- ◇ 2007 A. Shamir's fund conference travel award
- ◇ 2010-2012 Argonne scholar fellowship
- ◇ 2015 Courtesy appointment with the School of Health Research, Clemson University
- ◇ 2017 Audience appreciation award honorable mention (in top 5 papers) for the paper and video at ACM SIGKDD
- ◇ Travel awards 2017 for my lab: ACM SIGKDD, Supercomputing
- ◇ Travel awards 2018 for my lab: IEEE Big Data, American Physical Society (APS), Supercomputing
- ◇ Travel awards 2019 for my lab: Foundations of Computer Science (FOCS), Supercomputing, International Green and Sustainable Computing Conference (IGSC), SIAM Computational Science and Engineering
- ◇ IEEE High-Performance and Extreme Computing (HPEC) 2019 best student paper award for the paper on quantum approximate optimization
- ◇ Travel awards 2020 for my lab: SIAM PP 2020, Supercomputing 2020, IEEE Quantum Week 2020
- ◇ Outstanding Graduate Mentor Award 2020, Clemson University
- ◇ IEEE High-Performance and Extreme Computing (HPEC) 2022 best student paper award for the paper on optimal tensor network contraction for quantum circuit simulation. Patent filed at UD.
- ◇ 2023, PLOS One Editorial Board Long Service Award

Media Exposure of Our Work

◇ 2023, *Quantum computing in finance: steampunk chandeliers have their uses*, TechHQ 06/17/2023,

https://tinyurl.com/quantumfinance

- ◇ 2023, *DARPA ONISQ to exploit quantum computers*, International Defense, Security and Technology 1/6/2023, https://tinyurl.com/darpaquantum
- ◇ 2022, *Alexeev, Ibrahim and Safro Win Best Student Paper from the IEEE HPEC Conference*, HPCwire 11/23/2022, https://tinyurl.com/hpc22award
- ◇ 2022, *About IEEE HPEC 2022 Best Student Paper Award*, UDaily/For the Record 10/14/2022, tinyurl.com/ieeehpec22
- ◇ 2022, *Concentrating on Connections*, UDaily, https://tinyurl.com/safroconnections
- ◇ 2020, (in Russian) Решать реальные задачи на квантовых компьютерах позволит гибридный подход (*Using hybrid approach for solving real-life problems on quantum computers*), https://tinyurl.com/y28j55gp
- ◇ 2020, *Argonne Receives Two Awards from DARPA for Quantum Information Science*, HPCwire https://tinyurl.com/y8r2ekqv

- 2020, *Artificial intelligence could aid in fight against COVID-19*, The Newsstand https://tinyurl.com/safroaitextmining
- 2020, *Combing the best of quantum computing and classical computing*, The Newsstand https://tinyurl.com/safroqcomp
- 2019, *The best of both worlds: how to solve real problems on modern quantum computers*, Science Daily https://tinyurl.com/2p8ubme7, News Wise https://tinyurl.com/4rffeeyn, Innovation Toronto http://tiny.cc/87yrdz
- 2019, *Future of medicine: man or machine?*, Clemson World Magazine, https://clemson.world/research/medicine/, video at https://www.youtube.com/watch?v=Dt2iMb4h6UA
- 2018, *Learning continues throughout summer for ALCF student interns*, Argonne National Lab News, http://tiny.cc/xpxl9y
- 2016, *Charleston's next major disaster targeted in new research*, The Newsstand, https://tinyurl.com/2xbhenhm

Professional Activities

Advisory Board and Scientific Consulting:

- Swiss Innovation Valley
- The International Artificial intelligence and Quantum Technology Foundation
- SciFeat

Professional Societies:

- SIAM, ACM, IEEE

Editorial Boards

- Algorithms, Journal of Data Intelligence, PLOS One (academic editor in machine learning and network science areas), several special issues

Reviewer for Journals:

- More than 30 journals

Panel Member on Grant Committees:

- NSF, NASA, DOE, internal funding panels at several universities (2011-now)

Reviewer for Conferences:

- 3-4 conferences per year. Examples include LION, PPSN, NWS, SEA, ALENEX, SIAM CSC, DaWaK, LBD, etc.

Organization of (Mini)symposiums/Workshops:

- SIAM Computational Science and Engineering, "Multilevel methods for graphs and hypergraphs", mini-symposium, 2011
- The Institute for Computing in Science (ICIS), "Computational Methods for (Hyper)graphs", week long workshop, 2012, with Paul Hovland and Bruce Hendrickson

- ◇ Dagstuhl Workshop at Leibniz Center for Informatics: “High-performance Graph Algorithms and Applications in Computational Science”, week long workshop, 2014, with Ulrich Meyer, Henning Meyerhenke and Ali Pinar
- ◇ International Symposium on Mathematical Programming (ISMP), “Scalable Algorithms for Networks”, session, 2015
- ◇ Dagstuhl Workshop at Leibniz Center for Informatics: “High-performance Graph Algorithms”, week long workshop, 2018, with Henning Meyerhenke, and Richard Peng
- ◇ SIAM Parallel Processing and Scientific Computing, “Recent Advances and Trends in Hybrid Quantum-Classical Algorithms”, mini-symposium, 2020, with Yuri Alexeev and Ruslan Shaydulin

Technical Program Committees:

- ◇ Learning and Intelligent Optimization 2010, 2011, 2012, 2013
- ◇ IEEE International Workshop on Network Science 2013
- ◇ SIAM Workshop on Combinatorial Scientific Computing 2016
- ◇ International Conference on Big Data Analytics and Knowledge Discovery 2018, 2019 (DaWaK, former International Conference on Data Warehousing and Knowledge Discovery)
- ◇ Cloud Summit 2019 (IEEE Cloud Computing)
- ◇ 2nd International Workshop on Quantum Computing for Sustainable Computing 2019 (QCSC)
- ◇ INFORMS Optimization Society Conference 2020 (IOS)
- ◇ The First International Workshop on Literature-based discovery 2020 (LBD, co-located with PAKDD)
- ◇ International Workshop on Quantum Computing: Circuits Systems Automation and Applications 2020 (QC-CSAA, co-located with IEEE Computer Society Annual Symposium on VLSI)

Tutorial sessions:

- ◇ Learning and Intelligent Optimization 2010, "Multiscale methods for combinatorial optimization problems"
- ◇ Summer School on Network Science at USC 2013, "Multiscale Methods for Networks" and "When Multiscale Methods Meet Network Generation"
- ◇ Several theory and hands on tutorials on quantum algorithms for IBM Q and D-Wave at Argonne National Lab workshops and webinars (given by students in my lab), 2017-2019
- ◇ SIAM Parallel Processing and Scientific Computing 2020, “Solving combinatorial optimization problems with quantum computers”, with Yuri Alexeev and Ruslan Shaydulin
- ◇ IEEE Quantum Week 2020, “Combinatorial Optimization on Quantum Computers”, with Yuri Alexeev and Ruslan Shaydulin

Service:

- ◇ Graduate Recruiting Committee, Faculty Search Committee, Associate Dean for Research Search Committee, Awards Committee (2012-now)

Industrial Research Employment

Shopping.com, eBay Inc.
Research group 2007
Machine learning and data mining: large-scale text information clustering, product classification and prediction.

Quark Biotech, Inc.
Computational scientist 1998–2002

- ◇ Automated literature based discovery of scientific hypotheses
- ◇ Computational methods for statistical analysis of experimental data
- ◇ Analysis of gene expression data
- ◇ Development of biomedical databases
- ◇ Image analysis: spot detection and matching problems in electrophoresis

Industrial Development Employment

Gefen systems
Software Developer 1998–1999
Logic programming; Development of tools for automatic news classification.

D.A. systems
Software Developer 1995–1996
Development of REXX (scripting language) interpreter.

I.D.F.
Computer Systems Administrator 1992–1995
Administration of multi-user computer systems; System programming

The Weizmann Institute of Science
Algorithms Developer 1992–1993
Development of algorithms for numerical analysis and digital signal processing.

Selected Open Source Software (see https://github.com/isafro, not including industrial)

Funded Grant Proposals (Total for PI/co-PI roles = $4.54M)

Funding agencies: NSF, DOE, DARPA, Greenville Hospital System, BMW, internal funding.

Patents

Available in full CV

Notation for Publications

ML[1] – Machine Learning/Data Mining, GA – Graph Algorithms/Network Science, NLP – Natural Language Processing/Text Mining, MS – Multiscale Methods, QC – Quantum Computing, CSC – Combinatorial Scientific Computing, AGT – Agent-based Modeling, BIO – Applications in Biology/Medicine/Healthcare, ENG – Applications in Computational Engineering, VIS – Visualization, COMB – Other Combinatorics

Book Chapters

1. (CSC, GA) I. Safro, D. Ron, A. Brandt, *"Fast Multilevel Algorithms for Linear Ordering Problems"*, in "Computational Optimization: New Research Developments", Nova Science Publishers, ISBN: 978-1-60692-671-0, 2010
2. (ML) P. Bhavsar, I. Safro, N. Bouayanaya, R. Polikar, D. Dera *"Chapter 12: Machine Learning in Transportation Data Analytics"*, a book chapter in "Data analytics for intelligent transportation systems", A. Apon, R. Chowdhury, K. Dey eds., 2017
3. (GA) Manuel Penschuck, Ulrik Brandes, Michael Hamann, Sebastian Lamm, Ulrich Meyer, Ilya Safro, Peter Sanders, Christian Schulz "*Recent Advances in Scalable Network Generation*", a chapter in "Massive Graph Analytics", David Bader ed., Chapman and Hall/CRC, ISBN:978-0-36746-412-7, preprint at https://arxiv.org/abs/2003.00736, 2020

Journal Publications

The underlined co-authors are either my current or former students and completed a project or its major part before graduating.

4. INVITED PAPER (AGT,BIO) Ilya Safro, Lee Segel, *"Collective stochastic versions of playable games as metaphors for complex biosystems: Team Collect Four"*, **Complexity** 8 (2003), 46-55, download
5. (GA,CSC,MS) I. Safro, D. Ron, A. Brandt, *"A Multilevel Algorithm for the Minimum 2-sum Problem"*, **Journal of Graph Algorithms and Applications**, Vol. 10/2, 2006, download
6. IN SCIENCEDIRECT TOP-25 ARTICLES 2006 (GA,CSC,MS) I. Safro, D. Ron, A. Brandt, *"Graph Minimum Linear Arrangement by Multilevel Weighted Edge Contractions"*, **Journal of Algorithms**, Vol. 60/1, pp. 24-41, 2006, download
7. (BIO) L. Klipcan, I. Safro, B. Temkin, M. Safro, *"Optimal growth temperature of prokaryotes correlates with class II amino acid composition"*, **FEBS Letters**, Vol. 580/6, pp. 1672-1676, 2006, download
8. (GA,CSC,MS) I. Safro, D. Ron, A. Brandt, *"Multilevel Algorithms for Linear Ordering Problems"*, **ACM Journal of Experimental Algorithmics**, Vol. 13, pp. 1.4-1.20, 2008, download
9. (GA,CSC) E. Boman, U. Catalyurek, C. Chevalier, K. Devine, I. Safro, M. Wolf, *"Advances in Parallel Partitioning, Load Balancing, and Matrix Ordering"*, **Journal of Physics**, Vol. 180, 2009, download

[1] Due to heavy abuse and inconsistency in understanding of the term "AI" by the media and some scientists, I prefer to clarify the specific sub-areas of AI using ML, NLP, BIO, ENG, and partially GA. In fact, most of my works marked by ML, NLP, BIO, ENG, and some of GA are tasks of AI. Depending on the task, deep learning, neural nets and representation learning belong to some of these classes.

10. (CSC,MS,VIS) D. Ron, I. Safro, A. Brandt, *"A fast multigrid algorithm for energy minimization under planar density constraints"*, **SIAM Multiscale Modeling and Simulation**, Vol. 8, No. 5, pp. 1599-1620, 2010, download

11. (GA,MS,CSC) D. Ron, I. Safro, A. Brandt, *"Relaxation-based coarsening and multiscale organization of graphs"*, **SIAM Multiscale Modeling and Simulation**, Vol. 9, No. 1, pp. 407-423, 2011, download

12. (GA,CSC) J. Chen, I. Safro, *"Algebraic Distance on Graphs"*, **SIAM Journal on Scientific Computing**, Vol. 33, No. 6, pp. 3468-3490, 2011, download

13. (GA,MS,CSC) I. Safro, B. Temkin, *"Multiscale approach for network compression-friendly ordering"*, **Journal of Discrete Algorithms**, Vol. 9, pp. 190-202, 2011, download.

14. (CSC) A. Lyons, I. Safro, J. Utke, *"Randomized algorithms for Exploiting Jacobian Scarcity"*, **Optimization Methods and Software** 27(2), pp. 311-322, 2012, download.

15. (GA,MS) S. Leyffer, I. Safro *"Fast Response to Infection Spread and Cyber Attacks on Large-Scale Networks"*, **Journal of Complex Networks**, vol 1(2), pp. 183–199, 2013, download

16. (GA) N. Goldberg, S. Leyffer, I. Safro *"Optimal Response to Cyber Attacks and Epidemics in Networks"*, **Networks**, Volume 66 (2), pp. 145–158, 2015, download

17. (GA,MS,CSC) I. Safro, P. Sanders, C. Schultz *"Advanced Coarsening Schemes for Graph Partitioning"*, **ACM Journal of Experimental Algorithms**, vol. 19, pp. 2.2:1–2.2:24, 2015, download

18. (ML,MS,BIO) T. Razzaghi, O. Roderick, I. Safro, N. Marko *"Multiscale weighted support vector machines for classification of healthcare data with missing values"*, **PLOS ONE**, Volume 11(5), 2016, download.

19. (GA) A. Buluc, H. Meyerhenke, I. Safro, P. Sanders, C. Schulz *"Recent Advances in Graph Partitioning"*, LNCS 9220 volume on **Algorithms Engineering: Selected Results and Surveys**, 2016, Preprint at Arxiv download.

20. (GA,MS) Emmanuel John, Ilya Safro *"Single- and Multi-level Network Sparsification by Algebraic Distance"*, **Journal of Complex Networks**, Volume 3 (5), pp. 352–388, 2016, download

21. (GA) Christian L. Staudt, Michael Hamann, Alexander Gutfraind, Ilya Safro, Henning Meyerhenke *"Generating realistic scaled complex networks"*, **Applied Network Science**, vol. 2(1), 36p, 2017, https://doi.org/10.1007/s41109-017-0054-z, Springer

22. (GA,CSC,MS) J. Hungerford, W. Hager, I. Safro *"A Multilevel Bilinear Programming Algorithm for the Vertex Separator Problem"*, **Computational Optimization and Applications**, vol. 69, issue 1, pp. 189-223, 2018, https://doi.org/10.1007/s10589-017-9945-2, preprint at https://www.eecis.udel.edu/~isafro/papers/mlvsp-coap.pdf

23. (ML,BIO) T. Razzaghi, I. Safro, J. Ewing, E. Sadrfaridpour, J. Scott "Predictive Models for Bariatric Surgery Risks with Imbalanced Medical Datasets", **Annals of Operations Research**, Vol. 280(1-2), pp. 1–18, 2019, https://doi.org/10.1007/s10479-019-03156-8, preprint at https://www.eecis.udel.edu/~isafro/papers/bariatric-surgery.pdf

24. (GA) H. Ushijima-Mwesigwa, MD Z. Khan, M. Chowdhury, I. Safro *"Centralities for Networks with Consumable Resources"*, **Network Science**, Vol. 7(3), pp. 376–401, 2019, https://doi.org/10.1017/nws.2019.7, preprint at https://arxiv.org/abs/1903.00642

25. (ML,ENG) MD Zadid Khan, Mashrur Chowdhury, Sakib Mahmud Khan, Ilya Safro, Hayato Ushijima-Mwesigwa, *"Wireless Charging Utility Maximization and Intersection Control Delay Minimization Framework for Electric Vehicles"*, **Computer-Aided Civil and Infrastructure**

Engineering, Vol. 34(7), https://doi.org/10.1111/mice.12439, preprint at https://www.eecis.udel.edu/~isafro/papers/wireless-inters.pdf, 2019

26. (QC,GA) **INVITED PAPER** Ruslan Shaydulin, Hayato Ushijima-Mwesigwa, Christian F.A. Negre, Ilya Safro, Susan M. Mniszewski, Yuri Alexeev *"A Hybrid Approach for Solving Optimization Problems on Small Quantum Computers"*, **IEEE Computer**, Vol. 52(6), pp. 18–26, 2019, https://doi.org/10.1109/MC.2019.2908942
27. (GA,MS) V. Chauhan, A. Gutfraind, I. Safro *"Multiscale Planar Graph Generator"*, **Applied Network Science**, Vol. 4(46), 2019, https://doi.org/10.1007/s41109-019-0142-3, preprint at https://arxiv.org/abs/1802.09617
28. (NLP,ML,BIO) Marina Aksenova, Justin Sybrandt, Biyun Cui, Vitali Sikirzhytski, Hao Ji, Diana Odhiambo, Mathew Lucius, Jill R. Turner, Eugenia Broude, Edsel Peña, Sofia Lizzaraga, Jun Zhu, Ilya Safro, Michael D Wyatt, Michael Shtutman "*Inhibition of the DDX3 prevents HIV-1 Tat and cocaine-induced neurotoxicity by targeting microglia activation*", accepted in **Journal of Neuroimmune Pharmacology**, preprint at https://doi.org/10.1101/591438, 2019
29. (QC,GA,ML) R. Shaydulin, H. Ushijima-Mwesigwa, I. Safro, S. Mniszewski, Y. Alexeev "*Network Community Detection On Small Quantum Computers*", **Advanced Quantum Technologies**, Vol. 2(9), https://doi.org/10.1002/qute.201900029, preprint at https://arxiv.org/abs/1810.12484, 2019
30. (ML,MS) E. Sadrfaridpour, T. Razzaghi, I. Safro *"Engineering fast multilevel support vector machines"*, **Machine Learning**, Volume 108(11), pp. 1879—1917, Springer, 2019, https://doi.org/10.1007/s10994-019-05800-7, preprint at https://arxiv.org/abs/1707.07657
31. (GA,CSC,MS) R. Shaydulin, J. Chen, I. Safro *"Relaxation-Based Coarsening for Multilevel Hypergraph Partitioning"*, **SIAM Multiscale Modeling and Simulation**, vol. 17, issue 1, pp. 482-–506, 2019, preprint at https://arxiv.org/abs/1710.06552
32. (ML,ENG) William Locke, Justin Sybrandt, Ilya Safro, Sez Atamturktur ,"*Using Drive-by Health Monitoring to Detect Bridge Damage Considering Environmental and Operational Effects*", **Journal of Sound and Vibration**, vol. 468 (115088), preprint at https://doi.org/10.31224/osf.io/ntfdp, 2020
33. (ML,GA) Justin Sybrandt, Ruslan Shaydulin, Ilya Safro "*Hypergraph Partitioning with Embeddings*", **IEEE Transaction on Knowledge and Data Engineering (TKDE)**, 2020, DOI 10.1109/TKDE.2020.3017120, preprint at https://arxiv.org/abs/1909.04016
34. (QC,MS) Hayato Ushijima-Mwesigwa, Ruslan Shaydulin, Christian Negre, Susan Mniszewski, Yuri Alexeev, Ilya Safro *"Multilevel Combinatorial Optimization Across Quantum Architectures"*, **ACM Transactions on Quantum Computing**, vol. 2, issue 1, 2021, https://doi.org/10.1145/3425607, preprint at https://arxiv.org/abs/1910.09985
35. (GA) Zirou Qiu, Ruslan Shaydulin, Xiaoyuan Liu, Yuri Alexeev, Christopher S. Henry, Ilya Safro *"ELRUNA: Elimination Rule-based Network Alignment"*, **ACM Journal of Experimental Algorithmics**, vol. 26, pp, 1-–32, https://doi.org/10.1145/3450703, 2021, preprint at https://arxiv.org/abs/1911.05486
36. (GA,ENG) Hayato Ushijima-Mwesigwa, MD Zadid Khan, Mashrur Chowdhury, Ilya Safro "*Optimal Placement of Wireless Charging Lanes in Road Networks*", **Journal of Industrial and Management Optimization**, vol. 17, issue 3, pp. 1315-1341, 2021, preprint at https://www.eecis.udel.edu/~isafro/papers/optimal-wcl.pdf

37. (GA,CSC,MS) Hayato Ushijima-Mwesigwa, Jeffrey D. Hyman, Aric Hagberg, Ilya Safro, Satish Karra, Carl W. Gable, Gowri Srinivasan "*Multilevel Graph Partitioning for Three-Dimensional Discrete Fracture Network Flow Simulations*", **Mathematical Geosciences**, https://doi.org/10.1007/s11004-021-09944-y, preprint at https://arxiv.org/abs/1902.08029, 2021
38. (NLP,BIO) Justin Sybrandt, Ilya Safro "*CBAG: Conditional Biomedical Abstract Generation*", **PLOS One**, vol. 16(7): e0253905, https://doi.org/10.1371/journal.pone.0253905, preprint at https://arxiv.org/abs/2002.05637, 2021
39. (QC) Ruslan Shaydulin, Stuart Hadfield, Tad Hogg, Ilya Safro *"Classical symmetries and Quantum Approximate Optimization Algorithm"*, **Quantum Information Processing**, vol. 20(11), DOI https://doi.org/10.1007/s11128-021-03298-4, preprint at https://arxiv.org/pdf/2012.04713.pdf, 2021
40. (QC) Xiaoyuan Liu, Anthony Angone, Ruslan Shaydulin, Ilya Safro, Yuri Alexeev, Lukasz Cincio *"Layer VQE: A Variational Approach for Combinatorial Optimization on Noisy Quantum Computers"*, **IEEE Transactions on Quantum Engineering**, vol. 3, pp. 1-20, preprint at https://arxiv.org/abs/2102.05566, 2022
41. (QC,GA) Xiaoyuan Liu, Hayato Ushijima-Mwesigwa, Avradip Mandal, Sarvagya Upadhyay, Ilya Safro, Arnab Roy *"Leveraging Special-Purpose Hardware for Local Search Heuristics"*, **Computational Optimization and Applications**, vol. 82, pp. 1–29, preprint at https://arxiv.org/abs/1911.09810, 2022
42. (GA, ENG) Ahmad Momeni, Varsha Chauhan, Abdulrahman Bin Mahmoud, Kalyan Piratla, Ilya Safro "*Generation of Synthetic Water Distribution Data Using a Multi-Scale Generator-Optimizer*", **Journal of Pipeline Systems**, Vol. 14(1), 2023
43. (QC) Dylan Herman, Cody Googin, Xiaoyuan Liu, Yue Sun, Alexey Galda, Ilya Safro, Marco Pistoia, Yuri Alexeev "*Quantum Computing for Finance*", accepted in **Nature Physics Reviews**, preprint will be available soon, 2023
44. (QC) Alexey Galda, Eesh Gupta, Jose Falla, Xiaoyuan Liu, Danylo Lykov, Yuri Alexeev, Ilya Safro "*Similarity-Based Parameter Transferability in Quantum Approximate Optimization Algorithm*", accepted at **Frontiers in Quantum Science and Technology**, Issue on Variational Quantum Algorithms, 2023

Refereed Conferences (regular full-length papers)

45. (GA,CSC,MS) C. Chevalier, I. Safro, *"Comparison of coarsening schemes for multilevel graph partitioning"*, **Learning and Intelligent Optimization (LION)** (acceptance rate 18%), LNCS 5851, pp. 191–205. Springer, 2009, download
46. (GA,CSC,MS) I. Safro, P. Hovland, J. Shin, M. Strout, *"Improving random walk performance"*, In Proceedings of the 2009 **International Conference on Scientific Computing (CSC)**, pp. 108–112, CSREA Press, 2009, download
47. (ML) O. Roderick, I. Safro, *"Learning Highly Filtered Data by Nonlinear Spectral Methods"*, **Learning and Intelligent Optimization (LION)** (acceptance rate 21%), LNCS 6073, pp. 154–168. Springer, 2010, download
48. (GA,CSC) J. Chen, I. Safro, *"A Measure of the Connection Strengths between Graph Vertices"*, **International Conference on Computational Science (ICCS)**, vol. 4, pp. 196–205, 2011

49. (GA,CSC,MS) I. Safro, P. Sanders, C. Schultz *"Advanced Coarsening Schemes for Graph Partitioning"*, **Symposium on Experimental Algorithms (SEA)**, LNCS vol. 776, pp. 369-380, 2012, download

50. (GA,CSC,MS) W. Hager, J. Hungerford, I. Safro, "A Continuous Refinement Strategy for the Multilevel Computation of Vertex Separators", **Learning and Intelligent Optimization (LION)**, LNCS vol. 8426, pp. 77-81, 2014, download

51. (ML,MS) T. Razzaghi, I. Safro *"Scalable Multilevel Support Vector Machines"*, **International Conference on Computational Science (ICCS)**, Procedia Computer Science, Vol. 51, pp. 2683-–2687, 2015, download

52. (ML,MS,BIO) T. Razzaghi, O. Roderick, I. Safro, N. Marko *"Fast Imbalanced Classification of Healthcare Data with Missing Values"*, In Proceedings of **IEEE International Conference on Information Fusion (FUSION)**, pp. 774–781, 2015, download

53. (GA,MS) A. Gutfraind, L. A. Meyers, I. Safro *"Multiscale Network Generation"*, In Proceedings of **IEEE International Conference on Information Fusion (FUSION)**, pp. 158–165, 2015, download

54. (GA) C. Staudt, M. Hamann, I. Safro, A. Gutfraind, and H. Meyerhenke *Generating Scaled Replicas of Real-World Networks*, **Complex Networks & Their Applications V (COMPLENET)**, 2016, Studies in Computational Intelligence, vol 693. Springer, download

55. (ML,MS) E. Sadrfaridpour, T. Razzaghi, A. Luckow, K. Kennedy, S. Jeereddy, I. Safro *"Algebraic multigrid-inspired support vector machines"*, **European Symposium on Artificial Neural Networks (ESANN17)**, download, 2017

56. (NLP) (oral presentation, in top 8%; honorable mention for Audience Appreciation Award, in top 5 papers) J. Sybrandt, M. Shtutman, I. Safro "MOLIERE: Automatic Biomedical Hypothesis Generation System", In Proceedings of the 23rd **ACM SIGKDD International Conference on Knowledge Discovery and Data Mining**, pp. 1633-1642, download, 2017

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Papers at arxiv, technical reports, papers translated into other languages, dissertations, white papers, submitted works, and papers under revision are available in full CV

Presentations

1. More than 90 talks
2. More than 40 invited talks

Personal Information

Languages: English (fluent), Hebrew (fluent), Russian (fluent), German (beginner)