Curriculum Vitæ

Marek Eliáš

Date of birth: 25. 08. 1988

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Research Interests

Theory of algorithms and Discrete optimization. Topics related to solving optimization problems with limited information as studied in Online optimization and Differential privacy. ML-augmented algorithms.

Academic appointments

2021 –   Bocconi University, Milan
               Assistant professor

2020 – 2021   Centrum Wiskunde & Informatica, Amsterdam
               Postdoctoral researcher
               Host: Nikhil Bansal

2018 – 2020   École polytechnique fédérale de Lausanne
               Postdoctoral researcher
               Host: Michael Kapralov

Education

2014 – 2018   Technische Universiteit Eindhoven
               PhD
               Thesis: Algorithms for some metrical service systems
               Supervisor: Nikhil Bansal

2012 – 2014   Charles University in Prague
               Doctoral study (moved to TU Eindhoven)
               Topic: Discrete Geometry — algebraic, combinatorial and topological methods
               Supervisor: Jiří Matoušek

2010 – 2012   Charles University in Prague
               MSc
               Thesis: Erdős–Szekeres type theorems
               Supervisor: Jiří Matoušek

2006 – 2010   Charles University in Prague
BSc
Thesis: Integer programming and its applications
Supervisor: Martin Pergel

List of publications

Refereed conference publications

[1] Algorithms for Caching and MTS with reduced number of predictions. Karim Abdel Sadek and Marek Eliáš. In *Proceedings of ICLR 2024*. in press, 2024.

[2] Bandits with knapsacks with predictions. Davide Drago, Andrea Celli, and Marek Eliáš. In *Proceedings of UAI 2024*. in press, 2024.

[3] Paging with succinct predictions. Antonios Antoniadis, Joan Boyar, Marek Eliáš, Lene Monrad Favrholdt, Ruben Hoeksma, Kim S. Larsen, Adam Polak, and Bertrand Simon. In *Proceedings of International Conference on Machine Learning (ICML) '23*, volume 202, pages 952–968. PMLR, 2023. arXiv:2210.02775.

[4] Mixing predictions for online metric algorithms. Antonios Antoniadis, Christian Coester, Marek Eliáš, Adam Polak, and Bertrand Simon. In *Proceedings of the 40th International Conference on Machine Learning*, volume 202, pages 969–983. PMLR, 2023. arXiv:2304.01781.

[5] Learning-augmented dynamic power management with multiple states via new ski rental bounds. Antonios Antoniadis, Christian Coester, Marek Eliáš, Adam Polak, and Bertrand Simon. In *Advances in Neural Information Processing Systems (NeurIPS) '21*, volume 34, pages 16714–16726. Curran Associates, Inc., 2021. arXiv:2110.13116.

[6] Differentially private correlation clustering. Mark Bun, Marek Eliáš, and Janardhan Kulkarni. In *Proceedings of International Conference on Machine Learning (ICML) '21*, volume 139, pages 1136–1146. PMLR, 2021. arXiv:2102.08885.

[7] Online metric algorithms with untrusted predictions. Antonios Antoniadis, Christian Coester, Marek Eliáš, Adam Polak, and Bertrand Simon. In *Proceedings of International Conference on Machine Learning (ICML) '20*, volume 119, pages 345–355. PMLR, 2020. arXiv:2003.02144.

[8] Differentially private release of synthetic graphs. Marek Eliáš, Michael Kapralov, Janardhan Kulkarni, and Yin Tat Lee. In *Proceedings of Symposium on Discrete Algorithms (SODA) '20*, pages 560–578. SIAM, 2020.

[9] Nested convex bodies are chaseable. Nikhil Bansal, Martin Böhm, Marek Eliáš, Grigorios Koumoutsos, and Seeun William Umboh. In *Proceedings of Symposium on Discrete Algorithms (SODA) '18*, pages 1253–1260. SIAM, 2018. arXiv:1707.05527.

[10] Competitive algorithms for generalized k-server in uniform metrics. Nikhil Bansal, Marek Eliáš, Grigorios Koumoutsos, and Jesper Nederlof. In *Proceedings of Symposium on Discrete Algorithms (SODA) '18*, pages 992–1001. SIAM, 2018. arXiv:1707.04519.

[11] The (h, k)-server problem on bounded-depth trees. Nikhil Bansal, Marek Eliáš, Łukasz Jeż, and Grigorios Koumoutsos. In *Proceedings of Symposium on Discrete Algorithms (SODA) '17*, pages 1022–1037. SIAM, 2017. arXiv:1608.08527.

[12] Weighted k-server bounds via combinatorial dichotomies. Nikhil Bansal, Marek Eliáš, and Grigorios Koumoutsos. In *Proceedings of Symposium on Foundations of Computer Science (FOCS) '17*, pages 493–504. IEEE, 2017. arXiv:1704.03318.

[13] Improved approximation for vector bin packing. Nikhil Bansal, Marek Eliáš, and Arindam Khan. In *Proceedings of Symposium on Discrete Algorithms (SODA) '16*, pages 1561–1579. SIAM, 2016.

[14] Tight bounds for double coverage against weak adversaries. Nikhil Bansal, Marek Eliáš, Łukasz Jeż, Grigorios Koumoutsos, and Kirk Pruhs. In *Approximation and Online Algorithms — 13th International Workshop (WAOA) '15*, pages 47–58. Springer, 2015.

[15] Lower bounds on geometric Ramsey functions. Marek Eliáš, Jiří Matoušek, Edgardo Roldán-Pensado, and Zuzana Safernová. In *Proceedings of Symposium on Computational Geometry (SoCG) '14*, page 558–564. ACM, 2014. arXiv:1307.5157.

[16] Higher-order Erdős–Szekeres theorems. Marek Eliáš and Jiří Matoušek. In *Proceedings of Symposium on Computational Geometry (SoCG) '12*, pages 81–90. ACM, 2012. arXiv:1111.3824.

Journal publications

[1] Online metric algorithms with untrusted predictions. Antonios Antoniadis, Christian Coester, Marek Eliáš, Adam Polak, and Bertrand Simon. *ACM Trans. Algorithms*, 19(2), apr 2023.

[2] Nested convex bodies are chaseable. Nikhil Bansal, Martin Böhm, Marek Eliáš, Grigorios Koumoutsos, and Seeun William Umboh. *Algorithmica*, 82(6):1640–1653, 2020, arXiv:1707.05527.

[3] The (h, k)-server problem on bounded depth trees. Nikhil Bansal, Marek Eliáš, Łukasz Jeż, and Grigorios Koumoutsos. *ACM Trans. Algorithms*, 15(2), February 2019, arXiv:1608.08527.

[4] Tight bounds for Double Coverage against weak adversaries. Nikhil Bansal, Marek Eliáš, Łukasz Jeż, Grigorios Koumoutsos, and Kirk Pruhs. *Theory of Computing Systems*, Sep 2016.

[5] Lower bounds on geometric Ramsey functions. Marek Eliáš, Jiří Matoušek, Edgardo Roldán-Pensado, and Zuzana Safernová. *SIAM J. Discrete Math.*, 28(4):1960–1970, 2014, arXiv:1307.5157.

[6] Higher-order Erdős–Szekeres theorems. Marek Eliáš and Jiří Matoušek. *Advances in Mathematics*, 244(0):1–15, 2013, arXiv:1111.3824.

Preprints

[1] Marek Eliáš, Haim Kaplan, Yishay Mansour, and Shay Moran. Learning-augmented algorithms with explicit predictors. ArXiv:2403.07413.

List of talks

Invited talks

Learning-Augmented Algorithms with Explicit Predictors, Charles University in Prague, 2024

Stability in computation with uncertainty and private data analysis, Bocconi University, 2021

Stability in computation with uncertainty and private data analysis, Aarhus University, 2021

Robust algorithms for decision making with uncertainty, University of Twente, 2020

Differentially Private Release of Synthetic Graphs, Theory Lunch seminar,
University of Washington, 2020

Ramsey questions in Discrete Geometry, AG1 Mittagsseminar at MPI Saarbrücken, 2014

Ramsey questions in Discrete Geometry, Theory and Combinatorics Seminar at EPFL, 2014

Some Ramsey questions in Discrete Geometry, Mittagsseminar, ETH Zürich, 2013.

Conference presentations of accepted papers

Learning-Augmented Dynamic Power Management with Multiple States via New Ski Rental Bounds, NeurIPS 2021

Differentially Private Release of Synthetic Graphs, SODA 2020

Competitive Algorithms for Generalized k-Server in Uniform Metrics, SODA 2018

The (h, k)-Server Problem on Bounded-Depth Trees, SODA 2017

Higher-Order Erdős–Szekeres Theorems, SoCG 2012.

Invited talks in workshops

Learning-Augmented Algorithms with Explicit Predictors, Cargese Workshop on Combinatorial Optimization 2023, Porquerolles

Learning-Augmented Algorithms with Explicit Predictors, OPTIMAL workshop, Amsterdam, 2023

Mixing predictions for online metric algorithms, STTI workshop, Prague 2023

Online metric algorithms with untrusted predictions, STTI workshop, Prague 2021

Differentially Private Release of Synthetic Graphs, TPDP 2019

Differentially private release of synthetic graphs, IGAFIT AlgPie 2019, Bedlewo, Poland.

The (h,k)-Server Problem on Bounded-Depth Trees, STTI workshop, Prague 2017

Poster/short presentations

Nested Convex Bodies are Chaseable. HALG 2018, Amsterdam, Netherlands.

The (h, k)-Server Problem on Bounded-Depth Trees. HALG 2017, Berlin, Germany

Research visits

January 2020   Microsoft Research Redmond, duration: 2 weeks

July 2019   Microsoft Research Redmond, duration: 2 weeks

Fall 2016   Simons Institute for the Theory of Computing, duration: 2 months

Jun 2013   ETH Zürich, group Theory of Combinatorial Algorithms, duration: 3 weeks

Fellowships and awards

2024: Bocconi Junior Grant, EUR 10000

2015: stipend, "Combinatorial Optimization" summer school, Hausdorf Research Institute for Mathematics (HIM), Bonn

2015: stipend, "Approximation Algorithms" summer school, Max-Planck Institut for Informatics (MPI)

2013 - 2014: student grant, Charles University: GAUK 759073, Combinatorial structures in discrete geometry, co-applicant

Research project participation

2020 –   Optimization for and with Machine Learning (OPTIMAL)
                NWO GROOT, Netherlands. PI: Dick den Hertog

2018 – 2020   Sublinear Algorithms for Modern Data Analysis (SUBLINEAR)
                ERC Starting Grant no. 759471, EU. PI: Michael Kapralov

2014 – 2018   Convex Programming: new frontiers and new applications
                NWO VIDI grant no. 639.022.211, Netherlands. PI: Nikhil Bansal

2012 – 2014   Discrete and convex geometry: challenges, methods, applications (DISCONV)
                ERC Advanced Grant no. 267165, EU. PI: Imre Bárány

Professional service

(Sub)reviewer   SODA (2023, 2022, 2019), ICALP (2024, 2023, 2022, 2017), ESA (2021, 2020, 2019),
                ITCS (2023, 2021), SoCG (2019, 2018), NeurIPS (2023), ICML (2024),
                MFCS (2023, 2013), STACS (2019), APPROX (2017), COCOON (2018), GD (2016)

Journals: SIAM Journal on Computing: 2023, 2022
                ACM Transactions on Algorithms: 2020, 2020, 2019
                Operations Research Letters: 2019
                Discrete & Computational Geometry: 2021, 2014
                subreviewer for Journal of ACM: 2018

Supervision of students and postdocs

2023: Moritz Venzin (postdoc) (co-supervised with Laura Sanità)

2025: Matei-Gabriel Cosa (BSc) (co-supervised with Andrea Celli)

2023: Davide Drago (MSc) (co-supervised with Andrea Celli)

2023: Karim Abdel Sadek (BSc)

Teaching experience

2022, 2023, and 2024: Course director - Optimization, Bocconi University, Italy

2022: Course director - Theoretical Computer Science, Bocconi University, Italy

2022 and 2023: Instructor - Programming and Database Systems, Bocconi University, Italy

2019: Guest Lecturer. Algorithms, course for undergraduate students of computer science at EPFL.

2018: Guest Lecturer. Graphs and Algorithms, course for graduate students of mathematics at TU Eindhoven.

2015 and 2016: Linear Algebra, exercises class for undergraduate students of physics at TU Eindhoven.

2014, 2015, and 2016: Mathematics 1, exercises class for undergraduate students of electrical engineering at TU Eindhoven.

2013 and 2014: Optimization methods, exercises class for undergraduate students of computer science at Charles University.

2013: Combinatorial and Computational Geometry 1, exercises class for masters course for students of computer science at Charles University.

2013: Discrete mathematics, exercises class for undergraduate students of computer science at Charles University.

Institutional responsibilities

since 2022: organizer of the CS seminar series, Department of Computing Sciences, Bocconi University, Italy

2022, 2023, 2024: Doctoral school entrance selection committee, Department of Computing Sciences, Bocconi University, Italy

Other professional experience

From 2009 until 2014, I worked at Institute of Physics ASCR (FZU) on processing large data from the experiments in high energy physics. My main responsibilities were maintenance of network infrastructure and data transfers. While at FZU, I have written or co-authored several papers, mostly on best practices for network setup in the environment specific to high energy physics.