Adam Daniel Jozefiak

CONTACT
INFORMATION
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RESEARCH
INTERESTS

My research interests are algorithms, optimization, and theoretical computer science. Specifically, I am interested in utilizing randomization, dimension reduction, and sparsification in the design and analysis of efficient algorithms for large-scale and high-dimensional optimization and inference problems.

EDUCATION

M.Sc. Computer Science 2020-2022

University of British Columbia, Vancouver Canada
- Thesis: *Approximation Algorithms for the Generalized Sparsest Cut Problem via Diversity Embeddings into ℓ_1* [In Progress]
- Supervisor: F. Bruce Shepherd
- GPA: 94% (A+)

B.Sc. Computer Science and Mathematics, Combined Honours 2015-2020

University of British Columbia, Vancouver Canada
- Completed with Distinction
- Supervisor: F. Bruce Shepherd
- GPA: 91.5% (A+)

EMPLOYMENT

Graduate Research Assistant 2020-2022

Department of Computer Science, University of British Columbia

Graduate Teaching Assistant 2020, 2022

Department of Computer Science, University of British Columbia

Co-Founder, Director 2018-2020

Aevum Technologies LTD

Research Assistant 2018-2020

Vancouver School of Economics, University of British Columbia

Undergraduate Teaching Assistant 2016-2019

Department of Computer Science, University of British Columbia

JOURNAL
PUBLICATIONS

Ekström, S. E., Garoni, C., **Jozefiak, A.**, & Perla, J. (2021). Eigenvalues and Eigenvectors of Tau Matrices with Applications to Markov Processes and Economics. *Linear Algebra and its Applications.*

Jozefiak, A., & Hao Li, J. Z. (2016). Modelling Diffusion in a Physically Constrained System: A Numerical Approach. *STEM Fellowship Journal*, 2(1), 38-48.

CONFERENCE
PROCEEDINGS

Jozefiak, A., Shepherd, F.B., & Weninger, N. A Knapsack Intersection Hierarchy applied to All-or-Nothing Flow in Trees. In Submission to *IPCO 2022.*

WORKS IN PROGRESS	**Jozefiak, A.**, & Shepherd, F.B. Approximation Algorithms for the Generalized Sparsest Cut Problem via Diversity Embeddings into ℓ_1.

NOTABLE COURSE PROJECTS	**Jozefiak, A.** (2021). Towards Heuristic Weights for Sequential Monte Carlo by Future Likelihood Estimates. University of British Columbia CPSC 532W Project. [Link]

Jozefiak, A., & Pan, Y. (2019). Unsplittable Flow Problem on Paths and Trees: Closing the LP Relaxation Integrality Gap. University of British Columbia CPSC 531F Project. [Link]

RESEARCH EXPERIENCE

Department of Computer Science, University of British Columbia   2019-2022

Supervisor: F. Bruce Shepherd

Projects:
- Investigating approximation algorithms for the sparsest cut problem in hypergraphs via ℓ_1 diversity embeddings. Provided the first and optimal polynomial time approximation algorithm for this problem in the setting where the supply network is a graph and the demand network is a hypergraph. In addition, provided the first and optimal approximation algorithm for the hypergraph Steiner tree problem, a natural generalization of the classic Steiner tree problem. [M.Sc. Thesis]
- Investigated approximation algorithms and the power of linear programming hierarchies for the unsplittable flow problem on paths and trees.

Vancouver School of Economics, University of British Columbia   2018-2020

Supervisor: Jesse Perla

Projects:
- Benchmarked and developed fast and memory efficient iterative algorithms for solving large-scale Laplacian systems, the computational bottleneck of the package **VarianceComponentsHDFE.jl** that implements the leave-out correction for estimating variance components in high-dimensional two-way fixed effects models. **Resulted in 100-fold faster performance** over the state-of-the-art algorithm. [Link]
- Showed that novel results on the spectral properties of Tau matrices yield closed-form solutions and convergence rates for the stationary distributions of models of wealth/income inequality and portfolio dynamics.
- Developed **DiffEqOperators.jl**'s fast and memory efficient lazy matrix-free differential operators for solving systems of ordinary and partial differential equations. **Improved the speed and memory efficiency** of higher dimension operators by optimizing cache usage via convolutional kernels from neural network frameworks. [Link]
- Overhauled and updated **QuantEcon**'s open source Julia jupyter notebook lectures on computational economics, finance, econometrics, and data science. [Link]

TALKS AND PRESENTATIONS

- Towards Heuristic Weights for Sequential MonteCarlo by Future Likelihood Estimates. CPSC 532W project. University of British Columbia. Vancouver, Canada. 2021. [Slides] [Paper]
- Unsplittable Flow Problem on Paths and Trees: Closing the LP Relaxation Integrality Gap (with Y. Pan). CPSC 531F project. University of British Columbia. Vancouver, Canada. 2019. [Slides] [Survey]
- Modelling Diffusion in a Physically Constrained System: A Numerical Approach (with J. Z. Hao Li). Multidisciplinary Undergraduate Research Conference. Uni-

versity of British Columbia. Vancouver, Canada. 2017. [Slides]
- Modelling Diffusion in a Physically Constrained System: A Numerical Approach (with J. Z. Hao Li). Science One. University of British Columbia. Vancouver, Canada. 2015. [Slides]

PROFESSIONAL SERVICE	*Conference Review*
	European Symposium on Algorithms (ESA) 2022
	ACM-SIAM Symposium on Discrete Algorithms (SODA) 2022

TEACHING EXPERIENCE

University of British Columbia
Head Teaching Assistant

CPSC 121	Models of Computation	2017-2019 (8 Semesters)

Teaching Assistant

CPSC 421/501	Introduction to Theory of Computing (graduate)	Fall 2019, 2020
CPSC 313	Computer Hardware and Operating Systems	Summer 2018
CPSC 213	Introduction to Computer Systems	Summer 2017
CPSC 121	Models of Computation	Fall 2016, Winter 2022

AWARDS AND HONORS

- Electronic Arts Bursary in Computer Science (CAD $3,700), University of British Columbia, 2021
- Huawei Scholarships in Computer Science (CAD $5,000), University of British Columbia, 2020
- Graduation with Distinction, University of British Columbia, 2020
- Charles and Jane Banks Scholarship (CAD $350), University of British Columbia, 2020
- Science Scholar, University of British Columbia, 2019
- Dean's Honour List, University of British Columbia, 2019
- Stanley M. Grant Scholarship in Mathematics (CAD $4,000), University of British Columbia, 2018
- Undergraduate Teaching Assistant Award, Department of Computer Science University of British Columbia, 2018
- Dean's Honour List, University of British Columbia, 2018
- Best Blockchain Award, Copenhagen World Cup of Startups, 2017
- J Fred Muir Memorial Scholarship in Science (CAD $500), University of British Columbia, 2017
- Stanley M Grant Scholarship in Mathematics (CAD $4.000), University of British Columbia, 2017
- Trek Excellence Scholarship for Continuing Students (CAD $1,500), University of British Columbia, 2017
- Science Scholar, University of British Columbia, 2017
- Dean's Honour List, University of British Columbia, 2017
- Trek Excellence Scholarship for Continuing Students (CAD $1,500), University of British Columbia, 2016
- J Fred Muir Memorial Scholarship in Science (CAD $150), University of British Columbia, 2016
- Charles and Jane Banks Scholarship (CAD $350), University of British Columbia, 2016
- Larry Roberts Science One Memorial Scholarship (CAD $1,950), University of British Columbia, 2016
- Science Scholar, University of British Columbia, 2016

- Dean's Honour List, University of British Columbia, 2016
- Chancellor's Scholar Award, University of British Columbia, 2015
- B.C. Achievement Scholarship (CAD $500), Provincial Government of British Columbia, 2015

PATENTS	Bahrich, Nicholas. **Jozefiak, Adam**. Arias-Fuenzalida, Jonathan. 2019. DNA Containing Polymer Based Anti-counterfeit Coating For Object Identification, Authentication, Provenance And Manufacturing Method Thereof. LU100906, filed August 21, 2018, and issued August 21, 2019.
	Bahrich, Nicholas. Arias-Fuenzalida, Jonathan. **Jozefiak, Adam**. 2019. Irreproducible Plate Identifier For Object Authentication and Provenance And Manufacturing Method Thereof. LU100852, filed July 9, 2018, and issued July 9 2019.
PROFESSIONAL ORGANIZATIONS	Fellow at the Luxembourg House of Financial Technology 2018-2020
START-UP EXPERIENCE	**Aevum Technologies LTD** 2018-2020
	Co-founder and director of Aevum Technologies LTD, a former member of the Luxembourg House of Financial Technology, with the mission of providing authentication and provenance solutions with the use of novel patented physical identifier technology and blockchain solutions. Aevum Technologies LTD was liquidated in August of 2020.
RELEVANT SKILLS	Languages: English, Polish Programming: LaTeX, Julia, Python, C/C++, Java, MATLAB
LAST UPDATED	May 23, 2022