Evgenia-Maria S. Kontopoulou

Contact Information

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Research Interests

Randomized Numerical Linear Algebra, Scientific Computing, Big Data, Optimization, Data Mining, Information Retrieval, (Social) Network Analysis, Machine Learning, Databases, Data Analysis.

Education

Doctor of Philosophy (Ph.D.)
Computer Science, Purdue University **2016 - 2020**
Advisor: Petros Drineas

Bachelor of Engineering (B.Eng.) & Master in Engineering (M.Eng.)
Computer Engineering & Informatics, University of Patras **2006 - 2012**
Advisor: Efstratios Gallopoulos

Working Experience

Senior Engineer, The MathWorks, Inc.	**2020 - today**
Research Assistant, Purdue University	**2016 - 2020**
Software Engineer Intern, Mathworks Inc.	**May, 2019 - August, 2019**
Software Engineer Intern, Mathworks Inc.	**May, 2018 - November, 2018**
Research Visitor, Rensselaer Polytechnic Institute	**2015 - 2016**
Webpage Design, University of Patras	**2014 - 2015**
Teaching Assistant, University of Patras	**2013 - 2015**
Assistant for the Open Courses Project, University of Patras	**2013 - 2015**
External Partner, Greek Research & Technology Network	**2013 - 2014**

Publications

E. Kontopoulou, *"Randomized Numerical Linear Algebra Approaches for Approximating Matrix Functions"*, Ph.D. Dissertation (2020), Purdue University

E. Kontopoulou, G. Dexter, W. Szpankowski, A. Grama, P. Drineas, *"Randomized Linear Algebra Approaches to Estimate the Von Neumann Entropy of Density Matrices"*, IEEE Transactions on Information Theory (2020), Vol. 66, Issue 8, pp. 5003-5021

A. Bose, V. Kalantzis, E. Kontopoulou, M. Elkady, P. Paschou, P. Drineas, *"TeraPCA: a Fast and Scalable Software Package to Study Genetic Variation in Tera-scale Genotypes"*, in Oxford Bioinformatics (2019), Issue 1, pp. 3679-3683

E. Kontopoulou, A. Grama, W. Szpankowski, P. Drineas, *"Randomized Linear Algebra Approaches to Estimate the Von Neumann Entropy of Density Matrices"*, in Proceedings of the 2018 IEEE International Symposium on Information Theory (2018), pp. 2486-2490

P. Drineas, I. Ipsen, E. Kontopoulou, M. Magdon-Ismail, *"Structural Convergence Results for Low-Rank Approximations from Block Krylov Spaces"*, in SIAM Journal on Matrix Analysis and Applications (2018), Vol. 39, Issue 2, pp. 567-586

C. Boutsidis, P. Drineas, P. Kambadur, E. Kontopoulou, A. Zouzias, *"A Randomized Algorithm for Approximating the Log Determinant of a Symmetric Positive Definite Matrix"*, in Linear Al-

gebra and its Applications (2017), Vol. 533, pp. 95-117

K. Fountoulakis, A. Kundu, E. Kontopoulou, P. Drineas, *"A Randomized Rounding Algorithm for Sparse PCA"*, in ACM Transactions on Knowledge Discovery from Data (2017), Vol. 11, Issue 3, No. 38, pp. 1-26

E. Kontopoulou, M. Predari, E. Gallopoulos, *"Onomatology and Content Analysis of Ergodic Literature"*, in Proceedings of the 3rd ACM Narrative and Hypertext Workshop (2013), No. 5, pp. 1-5

E. Kontopoulou, M. Predari, T. Kostakis, E. Gallopoulos, *"Graph and Matrix Metrics to Analyze Ergodic Literature for Children"*, in Proceedings of the 23rd ACM Conference on Hypertext and Social Media (2012), pp. 133–142

Selected Code Based Research Projects

TeraPCA **C/C++, OpenMP, MPI**
GitHub Page

A library that computes the top Principal Components (PCs) of tera-scale matrices using Randomized Singular Value Decomposition (RandSVD). Our implementation is based on multi-threaded libraries such as LAPACKE, BLAS and MKL, and it can handle datasets which might exceed the amount of available system memory by performing out-of-core computations.

Large Scale Genetic Data Simulator **C/C++, OpenMP**
GitHub Page

A software that enables fast generation of simulated large scale genetic data using sophisticated random distributions to simulate the genetic patterns.

Text-to-Matrix Generator Version 7.8 **MATLAB**

Version 7.8 introduces a new set of operations. More specifically we implemented deterministic and partially randomized algorithms for skeleton matrix decomposition. The skeleton matrix decomposition methods (e.g. CUR, CX, RRQR e.t.c.) utilize scaled parts of the initial matrix to derive highly accurate and interpretable approximations of the term-by-document matrix.

Text-to-Matrix Generator Version 6.7 **MATLAB, Perl**
Software Page

The highlights of version 6.7 are the incorporation of filters that enable parsing and prepossessing non-ASCII documents and additional options that rule the construction of the dictionary. Users can process a variety of data formats (e.g., pdf, docx, doc, ps e.t.c.) and select among many more options on how to construct the dictionary (e.g., exclude alphanumerics, numerics e.t.c.).

Awards & Scholarships

SIAM Early Career Travel Award, for 2021 SIAM Conference on Applied Linear Algebra **April 2021**
Purdue University Nomination for the Google Fellowship 2019 (one of the two nominees selected university-wise) **December 2018**
John R. Rice Partial Fellowship in Scientific Computing **April 2018**
Purdue CS Scholarship to attend 2018 Grace Hopper Conference **April 2018**
Gerondelis Foundation Scholarship **November 2017**

NSF grant for XX Householder Symposium on Numerical Linear Algebra **June 2017**
Scholarship for the 26th PCMI Summer Session, "The Mathematics of Data" **March 2016**
Scholarship for CRA-W Grad Cohort Workshop 2016 **January 2016**
NAG Prize for the Best Presentation of the Session, "Matrix Algorithms and HPC for Large Scale Data Analysis", 2013 ERCIM **December 2013**
SIGWEB Ted Nelson Newcomer Award, ACM Hypertext 2012 Conference **June 2012**
SIGWEB Student Travel Award, for ACM Hypertext 2012 Conference **March 2012**

Selected Talks

"RandNLA Approaches to Estimate Logarithm-based Matrix Function", Invited Talk, 2021 SIAM Conference on Applied Linear Algebra (LA21), May 2021

"Randomized Linear Algebra Approaches to Estimate the Von Neumann Entropy of Density Matrices", 2018 IEEE International Symposium on Information Theory (ISIT), Vail, CO, June 2018

"Towards Randomized Algorithms for the Estimation of Log-Determinants and Von-Neumann Entropies", Purdue Theoretical Computer Science Seminars, West Lafayette, IN, October 2017

"Structural Convergence Results for Low-Rank Approximations from Block Krylov Spaces", XX Householder Symposium, Blacksburg, VA, June 2017

"A Randomized Rounding Algorithm for Sparse PCA", Purdue Numerical Linear Algebra Student Seminar, West Lafayette, IN, April 2017

"Randomized Algorithm for Approximating the Log Determinant of a Symmetric Positive Definite Matrix", CSESC 2017, Purdue University, West Lafayette, IN, April 2017

"Towards some RandNLA Techniques for Determinant Approximation, Sparse PCA and Analysis of Krylov Subspace Methods", Poster at Graduate Students' Showcase, Purdue University, West Lafayette, IN, September 2016

"The Text-to-Matrix Generator", Sixth Gene Golub SIAM Summer School , Delphi, GR, June 2015

"Experiments with Randomized Algorithms in the Text to Matrix Generator Toolbox",ERCIM 2013, London, GB, December 2013

"TMG a MATLAB Tool for Text Mining", Numerical Linear Algebra Day, Athens, GR, November 2011

Teaching Assistance

Foundations of Computer Science, RPI (CSCI 2200) **Spring Semester 2016**
Cryptography and Network Security, RPI (CSCI 4230) **Winter Semester 2015**
Numerical Analysis, UPatras (HY240) **Spring Semester 2015**
Linear Algebra UPatras (HY110) **Spring Semester 2014**
Scientific Computing I UPatras (HY343) **Winter Semester 2014**
Linear Algebra UPatras (HY110) **Spring Semester 2013**
Electronics Laboratory I UPatras (HY165E) **Winter Semester 2010**

Academic Peer-Review

Grace Hopper Conference, Data Science Track **2017 - 2019**
2018 International Symposium on Mathematical Foundations of Computer Science (MFCS)
IEEE Transactions on Signal Processing

	ACM Transactions on Mathematical Software (TOMS)	
	SIAM Journal on Imaging Science (SIIMS)	
	SIAM Journal on Matrix Analysis and Applications (SIMAX)	**2017 -2019**
	SIAM Journal on Scientific Computing (SISC)	**2017 - today**
	34th International Conference on Machine Learning (ICML)	

Qualifications & Information

Programming Languages

MATLAB, C++, C, Java, Python, PHP, HTML, CSS, Javascript, OPENMP, MPI, Perl

Languages

Greek (native), English (proficient), German (intermediate)

Memberships

SIAM, ACM, ACM-W

Other Activities

Mentoring undergraduate students on their diploma theses on the Text-to-Matrix Generator at University of Patras, Greece

President at the Hellenic Student Association at Purdue University.	**2019 - 2020**
Vice president at the Hellenic Student Association at Purdue University.	**2017 - 2019**

Additional Information

Date of Birth: January 13, 1989
Citizenship: Greek & Australian
Nationality: Greek
USA Visa Status: F1

Last Update January 26, 2022