DIMITRIS BERBERIDIS

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EDUCATION

University of Minnesota, MN, USA *Sept. 2015 - May 2019*
PhD. Electrical and Computer Engineering
Thesis: Active and Adaptive Techniques for Learning over Graphs,
Advisor: Prof. G. B. Giannakis

University of Minnesota, MN, USA *Sept. 2013 - July 2015*
MsECE. Electrical and Computer Engineering
Thesis: Online Censoring for Large-Scale Regressions and Dynamic Processes,
Advisor: Prof. G. B. Giannakis

University of Patras, Patras, Greece *Sept. 2007-Sept. 2012*
Diploma in Electrical and Computer Engineering
Thesis: Algorithms for recovery of sparse signals,
Advisor: Prof. G. V. Moustakidis

RESEARCH EXPERIENCE/ PROJECTS

Post-Doctoral Research Fellow, Carnegie Mellon University Aug. 2019 - Present
Data Analytics Techniques Algorithms lab (DATA) - with L. Akoglu

- **Graph Summarization / Anomaly Detection**
  - Developement of graph-summarization method for directed networks with edge multiplicities, based on the Minimum Description Length (MDL) criterion. Design of Locality-sensitive-hashing (LSH)-aided greedy algorithms for accelerating search in summarization space.
  - Application on summarizing financial transaction networks created by aggregating within-company accounting journals. Detection of anomalous edges and anomalous nodes in transaction graphs based on their compressibility scores.
- **Early prediction for predictive maintainance**
  - Developement of early time-series prediction/classification method usign the learning-with-privileged-information paradigm.
  - Application to server predictive maintainance.

Research Assistant, University of Minnesota Sept. 2013 - May 2019
Signal Processing in Networking and Communications group (SPiNCOM) - with G. B. Giannakis

- **Anomaly Detection on Graphs**
  - Development framework for detecting anomalous nodes/edges on labeled graphs, based on the Random-Sampling-and-Consencus (RANSAC) paradigm.
  - The proposed approach can be combined with any semi-supervised node-classifier.

- **Random-walk-based Personalized Recommendation**
  - Development of user-personalized recommendation system, based on implicit user feedback. The proposed method constructs item-item graph and performs random-walks with personalized per-user seeding distribution and restarting probabilities.
  - Designed and implemented high-performance parallel C implementation.
- **Adaptive and Unsupervised Node Embedding**
  - Introduced new "tunable" node-similarity metric that places different weights on different orders of node-proximity.
  - Utilised SVD-based similarity-matrix factorization, for low-dimensional embeddings that allow for implicit and unsupervised learning of graph-specific similarity-metric.
- **Active / Passive Semi-Supervised Learning Over Graphs**
  - Development of Active Learning framework for semi-supervised learning over graphs, by adaptively labeling nodes that inflict large model change .
  - Developement of random-walk-based node classification algorithm that learns per-class RW coefficients to fit underlying label distribution.
- **Sketching for Tracking of Dynamic Processes**
  - Proposed sketched Kalman Filter for tracking of dynamic processed from a large volume of (possibly) redundant measurements.
  - Analysis and testing of different sketching mechanisms.
- **Scalable kernel-based learning and feature extraction**
  - Development of online and scalable kernel-based non-linear feature extraction schemes for application on large-scale datasets
  - Utilization of the extracted features for fast linear classification and regression tasks
- **Adaptive Censoring for Large-Scale Regression**
  - Developement and alalysis of selective-update algorithms for approximately solving of big linear regression tasks.

PUBLICATIONS

Refereed Journal Publications

1. **D. Berberidis**, and G. B. Giannakis, "Node Embedding with Adaptive Similarities for Scalable Learning over Graphs," *IEEE Transactions on Knowledge and Data Engineering, 2019.*
2. **D. Berberidis**, A. N. Nikolakopoulos, and G. B. Giannakis, "Adaptive Diffusions for Scalable Learning over Graphs," *IEEE Transactions on Signal Processing, 2018.*
3. D. Lee, **D. Berberidis**, and G. B. Giannakis, "Adaptive Bayesian Radio Tomography," *IEEE Transactions on Signal Processing, 2018.*
4. F. Sheikholeslami, **D. Berberidis**, and G. B. Giannakis, "Large-scale Kernel-based Feature Extraction via Budgeted Nonlinear Subspace Tracking," *IEEE Transactions on Signal Processing, Vol.66, no.8, pp.1967 – 1981 , July 2018.*

5. **D. Berberidis** and G.B. Giannakis, "Data-adaptive Active Sampling for Efficient Graph-Cognizant Classification," *IEEE Transactions on Signal Processing, Vol.66, no.19, pp.5167 – 5179 , Oct. 2018.*

6. Z. Wang, Z. Yu, Q. Ling, **D. Berberidis**, and G.B. Giannakis, "Decentralized RLS with Data-Adaptive Censoring for Regressions over Large-Scale Networks," *IEEE Transactions on Signal Processing, Vol.66, no.6, pp.1634 – 1648 , January 2018.*

7. **D. Berberidis** and G. B. Giannakis, "Data Sketching for Large-Scale Kalman Filtering," *IEEE Transactions on Signal Processing, Vol.65, no.14, pp.3688 – 3701 , July 2017.*

8. **D. Berberidis**, V. Kekatos, and G. B. Giannakis, "Online Censoring for Large- Scale Regressions with Application to Streaming Big Data," *IEEE Transactions on Signal Processing, Vol.64, no.15, pp.3854 – 3867 , August 2016.*

Refereed Conference Publications

1. A. N. Nikolakopoulos, **D. Berberidis**, G. Karypis, and G. B. Giannakis, "Personalized Diffusions for Top-N Recommendation," *ACM Conference on Recommender Systems, 2019*

2. A. N. Nikolakopoulos, **D. Berberidis**, G. Karypis, and G. B. Giannakis, "Graph-Based Recommendation with Personalized Diffusions," *ACM International Conference on Knowledge Discovery and Data mining 2019 (Mining and Learning with Graphs Workshop)* (**Best Paper Award**)

3. **D. Berberidis**, A. N. Nikolakopoulos, and G. B. Giannakis, "AdaDIF: Adaptive Diffusions for Efficient Semi-supervised Learning over Graphs," *Proc. of IEEE Intl. Conf. on Big Data, Seattle, WA, Dec. 2018.*

4. **D. Berberidis**, A. N. Nikolakopoulos, and G. B. Giannakis, "Adaptive Diffusions for Scalable Learning over Graphs," ACM International Conference on Knowledge Discovery and Data mining 2018 (Mining and Learning with Graphs Workshop) (**Best Paper Award**)

5. D. Lee, **D. Berberidis**, and G. B. Giannakis, "Adaptive Bayesian Channel Gain Chartography," *Proc. of Intl. Conf. on Acoust., Speech, and Signal Processing, Calgary, Canada, April 2018.*

6. **D. Berberidis**, A. N. Nikolakopoulos, and G. B. Giannakis, "Random Walks with Restarts for Graph-Based Classification: Teleportation Tuning and Sampling Design," *Proc. of Intl. Conf. on Acoust., Speech, and Signal Processing, Calgary, Canada, April 2018.*

7. **D. Berberidis** and G. B. Giannakis, "Active Sampling for Graph-aware Classification," *Proc. of GlobalSIP Conf., Monreal, Canada, December, 2017.*

8. Z Wang, Z Yu, Q Ling, **D. Berberidis**, and G. B. Giannakis, "Distributed recursive least-squares with data-adaptive censoring," *Proc. of Intl. Conf. on Acoust., Speech, and Signal Processing, New Orleans, LA, March 2017.*

9. D. Romero, **D. Berberidis**, and G. B. Giannakis , "Quickest Convergence of Online Algorithms via Data Selection," *Proc. of Intl. Conf. on Acoust., Speech, and Signal Processing, Shanghai, China, March 20-25, 2016.*

10. **D. Berberidis** and G. B. Giannakis, "Data Sketching for Large-Scale Kalman Filtering," *Proc. of Intl. Conf. on Acoust., Speech, and Signal Processing, Shanghai, China, March 20-25, 2016.*

11. F. Sheikholeslami, **D. Berberidis**, and G. B. Giannakis, "Kernel-based low-rank feature extraction on a budget for big data streams," *Proc. of GlobalSIP Conf., Orlando, FL December, 2015.*

12. **D. Berberidis** and G. B. Giannakis, "Budgeted Kalman Filtering and Smoothing for Economical Tracking with Big Distributed Data," *Proc. of Asilomar Conf. on Signals, Systems, and Computers, Pacific Grove, CA, November 8-11, 2015.*

13. **D. Berberidis**, G. Wang, V. Kekatos, and G. B. Giannakis, "Online Censoring for Large-Scale Regression," *Proc. of Intl. Conf. on Acoust., Speech, and Signal Processing, Brisbane, Australia, April 19-24, 2015.*

14. G. Wang, **D. Berberidis**, V. Kekatos, and G. B. Giannakis, "Online Reconstruction from Big Data via Compressive Censoring," *Proc. of GlobalSIP Conf., Atlanta, GA, December 3-5, 2014.*

15. **D. Berberidis**, G. Wang, G. B. Giannakis, and V. Kekatos, "Adaptive Estimation from Big Data via Censored Stochastic Approximation," *Proc. of Asilomar Conf. on Signals, Systems, and Computers, Pacific Grove, CA, Novemeber 2-5, 2014.*

RESEARCH INTERESTS

Experience and background includes algorithms, analysis, optimization and application of machine learning on graphs, as well as statistical signal processing, and other data sciences. I aim at discovering simple yet expressive models, developping flexible and scalable algorithmic frameworks, together with efficient and portable software tools.

I am particularly interested on learning over graphs, using embeddings, hashing, neural networks, and other techniques to predict, classify and/or detect anomalies on large, multilayered, and possibly streaming networks that arise from real-world processes.

PROGRAMMING, SCRIPTING AND TOOLBOXES

C, C++: PETSc/SLEPc, BLAS/LAPACK, OpenMP, MPI
Python: Networkx, iGraph, CVX-opt, Scikit-learn, Matplotlib, Tensorflow
MATLAB: LIBLINEAR, LIBSVM, cvx, signal processing toolbox

HONORS AND AWARDS

Best Paper Award: KDD 2019 Mining and Learning with Graphs workshop, Aug. 2019

Best Paper Award: KDD 2018 Mining and Learning with Graphs workshop, Aug. 2018

Gerontelis Foundation Scholarship, Oct. 2016

UoM ECE Department Fellowship, Aug. 2013 - Aug. 2014

Distinguished Academic Performance Award (National Scholarships Foundation), 2011-12

"Vassilios Makios" award for communications and electronics 2010-11 Department of Electrical and Computer engineering, University of Patras

SERVICES

Teaching Assistance

- Digital signal Processing (Fall '16) University of Minnesota
  - Delivered lectures, organized class project, homeworks and lab assignments.

Reviewing

- IEEE Transactions on: { Signal Processing, Information Theory, Cybernetics }
- Programm Committee for ICASSP 2020
- Elsevier Signal Processing Journal
- Data Mining and Knowledge Discovery

LINKS

Personal Website: www.berberidis.net

Github: https://github.com/DimBer

Scholar: https://scholar.google.com/citations?user=Xl-AddMAAAAJ&hl=en

REFERENCES

Available upon request