Armin Moharrer

Curriculum Vitae

PERSONAL DETAILS

Birth	February 3, 1993
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Phone	+1 (857) 500-3675
Address	Northeastern University, 805 Columbus Ave, Boston, MA
Webpage	https://arminmrm.github.io

EDUCATION

Ph.D. in Electrical and Computer Engineering Jan 2016-present
GPA: 4.00
Northeastern University, Boston, MA
Under supervision of Dr. Stratis Ioannidis

M.Sc. in Electrical and Computer Engineering Jan 2016-May 2018
GPA: 4.00
Northeastern University, Boston, MA
Under supervision of Dr. Stratis Ioannidis

B.Sc. in Electrical Engineering Sep 2011- Aug 2015
GPA: 18.12 out of 20.00
Amirkabir University of Technology (Tehran Polytechnique), Tehran, Iran
With concentration on communication systems

RESEARCH INTERESTS

- **Data Mining**
- **Distributed Algorithms**
- **Machine Learning**
- **Numerical Optimization**

PUBLICATIONS

1. **Distributing Frank-Wolfe via Map-Reduce**, Armin Moharrer and Stratis Ioannidis, International Conference on Data Mining (ICDM) 2017, New Orleans, LA, USA. **Selected among the "Best Papers of ICDM 2017", shortlisted for publication to Knowledge and Information Systems (KAIS).**
2. **Distributing Frank-Wolfe via Map-Reduce**, Armin Moharrer and Stratis Ioannidis, *officially accepted to* Knowledge and Information Systems (KAIS), 2018.
3. **Kelly Cache Networks**, Milad Mahdian, Armin Moharrer, Stratis Ioannidis, and Edmuned Yeh, Submitted to INFOCOM 2019.

SELECTED COURSES

- **High-Performance Computing: 4.00**
- **Numerical Optimization: 4.00**
- **Advanced Machine Learning: 4.00**
- **Machine Learning: 4.00**

PROJECTS

- **Distributing Frank-Wolfe via Map-Reduce.** We proposed two formal conditions under which the Frank-Wolfe algorithm can be distributed via map-reduce framework. We proved that these conditions are satisfied by several convex optimization problems, including experimental design, Adaboost, projection on a convex hull, etc. We implemented the parallel Frank-Wolfe algorithm in Python using Apache Spark to distribute computation. Experiments over a cluster of 448 CPUs showed that we can solve problems with 20 million variables in 79 minutes; the same operation takes 48 hours when executed serially.
- **Massive Graph Distances via ADMM** (*in progress*). We proposed a metric for measuring distance between graphs. Computing this metric requires minimizing a convex function subject to linear constraints. We showed that this problem can be parallelized via Alternating Direction Method of Multipliers (ADMM). We implemented the algorithm in Apache Spark. We can run our algorithm for graphs with 81K nodes and 1.7M edges on Google Cloud Platform over a cluster of 15 machines with 64 CPUs.
- **Kelly Cache Networks.** We determined how to place objects in a network of caches to attain a certain design objective, such as, e.g., minimizing network congestion or retrieval delays. This problem can be cast as an NP-hard submodular maximization problem. For these problems the continuous greedy algorithm attains theoretical guarantees. We proposed a novel variant of this algorithm which uses power series expansion to eschew randomization. We implemented both the proposed algorithm and the conventional algorithm in Python. Experimental results over a dataset of 9 different networks showed that our algorithm runs almost 100 times faster than the randomized algorithm while providing the same solution.

TECHNICAL PRESENTATIONS

- **Distributing Frank-Wolfe via Map-Reduce**, New England Machine Learning Day 2018 (poster session), Microsoft Research, Cambridge, MA.
- **Distributing Frank-Wolfe via Map-Reduce**, International Conference on Data Mining (ICDM) 2017, New Orleans, LA.

SKILLS

Languages	Farsi (mother tongue) English (fluent)
Software	Python, Spark, C++, MATLAB, LaTeX, C

TEACHING AND MENTORING

- Teaching Assistant for *Parallel Data Analysis*, Spring 2017, Northeastern University
- Mentor for *NSF REU* program, Mentee: Chester Moses, Summer 2017, Northeastern University
- Mentor for *NSF REU* program, Mentee: Jasmin Gao, Summer 2018, Northeastern University