KONSTANTINOS KONSTANTINIDIS

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Personal Information

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Google Scholar:	https://scholar.google.com/citations?user=pLi_5zwAAAAJ&hl=en

Education

January 2017 - December 2022 (expected)	**Ph.D. in Electrical and Computer Engineering** Department of Electrical and Computer Engineering, Iowa State University, Ames, IA. Advisor: Professor Aditya Ramamoorthy. Current GPA: 3.94/4.0.
September 2011 - December 2016	**Diploma in Electrical and Computer Engineering (5-year program)** School of Electrical and Computer Engineering, Technical University of Crete, Chania, Greece. Thesis: "*Fast Synchronization of OQPSK Signals.*" Advisor: Professor George N. Karystinos. GPA: 3.4/4.0.

Research Interests

- Distributed Computing.
- Machine Learning.
- Network Coding.

Academic Experience

January 2017 - Present	**Graduate Research Assistant**
	Application of Coding Theoretic Techniques to Robust Machine Learning and Distributed Computing.
	Iowa State University.
Fall 2020	**Graduate Teaching Assistant**
	EE 571: Convex Optimization
	Enrollment: 20+ students
	Iowa State University.
Spring 2019	**Graduate Teaching Assistant**
	EE 322: Probabilistic Methods for Electrical Engineers
	Enrollment: 70+ students
	Iowa State University.
Fall 2018	**Graduate Teaching Assistant**
	EE 322: Probabilistic Methods for Electrical Engineers
	Enrollment: 50+ students
	Iowa State University.

Graduate Research Experience

January 2020 - Present	Department of Electrical and Computer Engineering, Iowa State University.
	Project: Robust Machine Learning
	Description: Developed a novel defense for distributed deep learning scenarios in which computing devices may return erroneous or malicious gradients in an effort to fool the training. The method is robust to the most sophisticated attacks and achieves on average a 20% increase in top-1 accuracy on CIFAR-10 dataset over defenses suggested by prior work. It maintains training convergence even when 30% of the devices behave adversarially and enjoys a 36% reduction on the fraction of corrupted gradients.
	Supervisor: Prof. Aditya Ramamoorthy.
May 2017 - April 2020	Department of Electrical and Computer Engineering, Iowa State University.
	Project: Communication-Efficient Distributed Computing
	Description: Developed an algorithm to reduce MapReduce communication time across the servers on AWS EC2 platform. Tweaked the baseline TeraSort algorithm, popular for sorting large datasets (generated and fetched within the HDFS system) and adapted it to our scheme. The method uses MPI to facilitate communication among the servers and achieves significant speedups of up to $4.7\times$. Extended this work to the case when the desired functions can be aggregated (amenable to deep learning applications). Its speedup is $4.3\times$ over the baseline approach.
	Supervisor: Prof. Aditya Ramamoorthy.

Industry Experience

June 2021
- August 2021

Software Engineering Intern at C3.ai
Implemented an end-to-end framework for cluster failure prediction; the framework has two components. The first one is the data pipeline which loads cluster health metrics, handles missing data and creates a training data set. The second component is the ML pipeline which trains a model and makes predictions regarding the cluster's state as soon as new test data becomes available. Followed the process of continuous integration / continuous deployment (CI/CD).

Publications

- K. Konstantinidis and A. Ramamoorthy, "Aspis: A Robust Detection System for Distributed Learning," (preprint), August 2021.
  Available online: https://arxiv.org/abs/2108.02416

- K. Konstantinidis and A. Ramamoorthy, "ByzShield: An Efficient and Robust System for Distributed Training," *Machine Learning and Systems (MLSys)*, April 2021.
  Available online: https://proceedings.mlsys.org/paper/2021/file/d9d4f495e875a2e075a1a4a6e1b9770f-Paper.pdf

- K. Konstantinidis and A. Ramamoorthy, "Resolvable Designs for Speeding up Distributed Computing," *IEEE Transactions on Networking (ToN)*, May 2020.
  Available online: https://ieeexplore.ieee.org/document/9103948

- K. Konstantinidis and A. Ramamoorthy, "CAMR: Coded Aggregated MapReduce," *IEEE International Symposium on Information Theory (ISIT)*, July 2019.
  Available online: https://ieeexplore.ieee.org/document/8849227

- K. Konstantinidis and A. Ramamoorthy, "Leveraging Coding Techniques for Speeding up Distributed Computing," *IEEE Global Communications Conference (GLOBECOM)*, December 2018.
  Available online: https://ieeexplore.ieee.org/document/8647133

- L. Tang, K. Konstantinidis and A. Ramamoorthy, "Erasure Coding for Distributed Matrix Multiplication for Matrices With Bounded Entries," *IEEE Communications Letters*, January 2019.
  Available online: https://ieeexplore.ieee.org/document/8528366

Awards

June 2019	**Best Student Poster Award**
	Midwest Machine Learning Symposium (MMLS), Madison, WI.
April 2019	**Teaching Excellence Award**
	Iowa State University, Ames, IA.
June 2018	**Academic Excellence Award**
	Gerondelis Foundation, Lynn, MA.
March 2018	**John Hatsios and Andromache Tsandes Award**
	Iowa State University, Ames, IA.

Paper Review Duties

- *IEEE* Transactions on Communications (TCOM).

- *IEEE* International Symposium on Information Theory (ISIT).

Undergraduate Internship And Project Experience

August 2016	School of Mineral Resources Engineering, Technical University of Crete. Interned in Geodesy & Geomatics Lab. Project: Development of an Android app that stores geodesy measurements on server. Supervisor: Grad. student Dimitrios Galanakis.
July 2016	School of Mineral Resources Engineering, Technical University of Crete. Interned in SenseLab Laboratory. Project: Representation of a cylindrical geological core in horizontal plane. Supervisor: Assist. Prof. Panayotis Partsinevelos.
January 2015	School of Electrical and Computer Engineering, Technical University of Crete. Carried out research in probabilistic graphical models. Project: Implementation of forward/backward inference (Viterbi) as well as learning (Baum Welch) algorithms on the Dishonest Casino problem. Supervisor: Assoc. Prof. Aggelos Bletsas.

Selected Graduate Coursework

- **Machine Learning**
  Grade: A.

- **Data Analytics in Electrical and Computer Engineering**
  Grade: A.

- **Random Processes for Communications and Signal Processing**
  Grade: A.

- **Deep Learning**
  Grade: A-.

- **Numerical Analysis of High Performance Computing**
  Grade: A.

Selected Undergraduate Coursework

- **Information Theory and Coding**
  Grade: 10/10.

- **Statistical Signal Processing for Telecommunications**
  Grade: 10/10.

- **Probabilistic Graphical Models (graduate course)**
  Grade: 8/10.

- **Convex Optimization**
  Grade: 8.5/10.

- **Modeling and Performance Evaluation of Communication Networks**
  Grade: 10/10.

Skills

Programming Languages
Proficient: Python, SQL, Matlab, **Good**: C++, Java, Bash.

Interfaces/Frameworks
Proficient: AWS, PyTorch, NumPy, MPI, MapReduce **Good**: scikit-learn, Hadoop, HDFS, Git, Jenkins, Splunk.

Networking
FTP, SSH, DDNS, VPN, WOL.

Miscellaneous
Windows, Linux, Excel, LaTeX.