

Vipul Gupta

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Education

2016-Present **University of California, Berkeley.**

Ph.D. in *Electrical Engineering and Computer Sciences (EECS)*

Advisors: Kannan Ramchandran and Thomas Courtade

Research interests: Distributed Machine Learning, Applied Statistics, Information Theory

2015-2016 **Indian Institute of Technology (IIT) Kanpur, India.**

Master of Technology in *Electrical Engineering*

Advisors: Ajit K. Chaturvedi and Ketan Rajawat

2011-2015 **Indian Institute of Technology (IIT) Kanpur, India.**

Bachelor of Technology in *Electrical Engineering* with distinction

Minors in *Computer Science*

Selected Publications

Preprint:

- 2020 **V. Gupta**, D. Choudhary, P. Tang, X. Wei, X. Wang, Y. Huang, A. Kejariwal, K. Ramchandran and M. Mahoney, "Fast Distributed Training of Deep Neural Networks: Dynamic Communication Thresholding for Model and Data Parallelism", [[pdf](#)] .
- 2020 **V. Gupta**, A. Ghosh, M. Derenzinski, R. Khanna, K. Ramchandran, M. Mahoney, "LocalNewton: Reducing Communication Rounds for Distributed Learning", [[pdf](#)] .
- 2020 A. Aghazadeh, **V. Gupta**, A. DeWeese, O. Koyluoglu, K. Ramchandran, "BEAR: Sketching BFGS Algorithm for Ultra-High Dimensional Feature Selection in Sublinear Memory", [[pdf](#)]
- 2020 **V. Gupta**, S. Padhe, T. Courtade, and K. Ramchandran, "Utility-based Resource Allocation and Pricing for Serverless Computing", [[pdf](#)] [[code](#)] .

Published:

- 2020 **V. Gupta**, S. Akle, and D. DeCoste, "Stochastic Weight Averaging in Parallel: Large-batch Training that Generalizes Well", International Conference on Learning Representations (ICLR), Ethiopia, 2020 [[pdf](#)] .
- 2020 **V. Gupta**, D. Carrano, Y. Yang, V. Shankar, T. Courtade, and K. Ramchandran, "Serverless Straggler Mitigation using Local Error-Correcting Codes" IEEE International Conference on Distributed Computing Systems (ICDCS), Singapore, 2020 [[pdf](#)] [[code](#)] .
[**Best Paper Award Finalist** (Top 3 out of 584 submissions)]
- 2020 **V. Gupta**, S. Kadhe, T. Courtade, M. Mahoney and K. Ramchandran, "OverSketched Newton: Fast Convex Optimization for Serverless Systems", In *Proc. of the IEEE International Conference on Big Data 2020*. [[pdf](#)] [[code](#)] .
(Also a **Spotlight Presentation** in ICML Workshop 2019 [[video](#)])
- 2018 **V. Gupta**, S. Wang, T. Courtade and K. Ramchandran, "OverSketch: Approximate Matrix Multiplication for the Cloud", In *Proc. of the IEEE International Conference on Big Data 2018*, Seattle, WA, USA. [[pdf](#)] [[code](#)] .
- 2017 J. Zhu, Y. Pu, **V. Gupta**, C. Tomlin, and K. Ramchandran, "A sequential approximation framework for coded distributed optimization," In *IEEE 55th Annual Allerton Conference Communication, Control, and Computing (Allerton)*, 2017 [[pdf](#)]

- 2017 S. Kafle, **V. Gupta**, B. Kailkhura, T. Wimalajeewa and P. K. Varshney, "Joint Sparsity Pattern Recovery with 1-bit Compressive Sensing in Distributed Sensor Networks," in *IEEE Transactions on Signal and Information Processing over Networks*. [\[pdf\]](#)
- 2017 **V. Gupta**, S. S. Kalamkar and A. Banerjee, "On Secure Communication Using RF Energy Harvesting Two-Way Untrusted Relay," *IEEE Global Communications Conference (GLOBECOM)*, Singapore, 2017. [\[pdf\]](#) .
- 2016 **V. Gupta**, A. K. Sah and A. K. Chaturvedi, "Iterative Matrix Inversion Based Low Complexity Detection in Large/Massive MIMO Systems", accepted for publication in *IEEE International Conference on Communications (ICC) Workshops 2016*, Kuala Lumpur, Malaysia. [\[pdf\]](#).
- 2016 C. Aprile, L. Baldassarre, **V. Gupta**, J. Yoo, M. Shoaran, Y. Leblebici and V. Cevher, "Learning-based near-optimal area-power trade-offs in hardware design for neural signal acquisition," in *ACM Inter. Conf. on Green Lakes Symp. on VLSI (GLSVLSI) 2016*, Boston, USA. [\[pdf\]](#)
- 2015 **V. Gupta**, B. Kailkhura, T. Wimalajeewa and P. K. Varshney, "Joint Sparsity Pattern Recovery with 1-bit Compressive Sensing in Sensor Networks", in *Proc. of the Asilomar Conference on Signals, Systems, and Computers 2015*, Pacific Grove, CA, USA. [\[pdf\]](#).

Google scholar profile: [Vipul Gupta](#)

Honors and Awards

- 2020 **Best Paper Finalist** at 40th IEEE International Conference on Distributed Computing Systems
- 2016 Awarded a one-year **Graduate Fellowship** by the department of EECS at UC Berkeley
- 2015 Awarded **EPFL-IIT** summer-intern scholarship for excellent research and academic background
- 2013 Selected for **SURGE'13** summer research program, awarded to only 100 students across India
- 2013 **Academic Excellence Award** 2011-12 recipient, awarded to top 5% students at IIT Kanpur
- 2011 Secured **All India Rank 464** (in 4,75,000 students) in IIT-JEE 2011 (Top 0.1%)
- 2011 Secured **All India Rank 63** (in 10,00,000 students) and State Rank 3 in AIEEE'11 (Top 0.01%)
- 2010 Selected among **Top 1%** students in National Physics Olympiad 2010 in the state of Rajasthan
- 2011-15 Awarded **Shanti and Ramkishore Sahai Saxena Memorial Scholarship** for being in good academic standing throughout the stay at IIT Kanpur

Professional Experience

- May–Oct'20 **Fast Distributed Training of Deep Recommender Systems, ML Infrastructure, Facebook.**
 Manager : Arun Kejariwal
Objective: Develop state-of-the-art techniques to improve the training efficiency of deep learning recommender models, and implement them into production models at Facebook to see practical improvements in end-to-end training times.
- May–Aug'19 **Accelerating Training of Deep Neural Networks, AI Research, Apple, Cupertino.**
 Manager : Dennis DeCoste
Objective: Devise algorithms to reduce the time to train deep neural networks across multiple GPUs by tackling challenge of generalization drop due to large-batch training.
- Dec'17–Jan'18 **Fault Tolerance for Distributed Computation in Apache REEF, Microsoft Research India.**
 Manager : Harsha Vardhan Simhadri
Objective: Explore the use of error-correcting codes for efficient straggler mitigation schemes for basic distributed linear algebra and machine learning algorithms in Apache REEF.

- May–July'15 **Fast Structure Aware Sampling**, *Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland*.
 Advisor : Prof. Volkan Cevher
Objective: To select minimum number of components from the Hadamard transform of the input signal to facilitate efficient recovery of the input signal with state-of-the-art performance results.
- May–July'14 **Joint Support Recovery with 1-bit Compressive Sensing**, *Syracuse University, NY, USA*.
 Advisor : Prof. Pramod K. Varshney
Objective: To solve the problem of sparse support recovery with 1-bit quantized compressive measurements in the presence of multiple sensors.
- May–July'13 **Low Complexity Sphere Decoding in MIMO Systems**, *SURGE, IIT Kanpur, India*.
 Advisor : Prof. Ajit K. Chaturvedi
Objective: To devise a low complexity sphere decoding algorithm for MIMO Systems with theoretical guarantees on its accuracy.

Leadership

- 2019–Present **Co-organizer**, *BLISS Seminar, UC Berkeley*.
 Contact and invite distinguished researchers from universities and industry to give a talk at the Berkeley Laboratory for Information and System Sciences (BLISS) Seminar. Also involves publicizing the event across different departments in the campus.
- 2014–15 **Company Relations Team**, *Students Placement Office, IIT Kanpur*.
 Contacted and persuaded HRs from different companies to visit campus for recruitment of students. Involved in dissemination of regular updates on current market trends and how they may shape hiring opportunities in the future.
- 2013–14 **Manager**, *Techkriti Grand Prix (TGP)*, Techkriti'14, IIT Kanpur.
 Conceptualized and organized the racing event TGP which saw participation from 40 teams all over the country. Worked with a three-tier team of 50 coordinators and secretaries and around 60 workers.
- 2012–13 **Coordinator**, *Electronic Circuit Design Competition*, Techkriti'13, IIT Kanpur.
 Designed and validated the problem statement of electronics competition, and popularized the event among other college students by creating ambassadors in outside colleges, and fetched a participation of more than 300 students for the event.

Teaching

- Fall'19 **Graduate Student Instructor**, *EE229A, Information and Coding Theory*, UC Berkeley.
- Spring'19 **Graduate Student Instructor**, *EECS126, Probability and Random Processes*, UC Berkeley.
- Fall'16 **Teaching Assistant**, *EE320, Principles of Communications*, IIT Kanpur.
- Spring'15 **Teaching Assistant**, *EE380A, Control Systems Lab*, IIT Kanpur.