Kumar Kshitij Patel | CV

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Research Interests: Federated Learning, Optimization, Machine Learning Theory, Deep Learning.

Education

- **Toyota Technological Institute at Chicago** — **Chicago,IL,USA**
  Ph.D., Advisor: ***Prof. Nathan Srebro****, CGPA:3.90/4.0* — *Sep 2019–Present*
- **École Polytechnique Fédérale de Lausanne** — **Lausanne,CH**
  Year-long Academic Exchange, CGPA: 5.43/6.0 — *2017–2018*
- **Indian Institute of Technology Kanpur** — **Kanpur, IND**
  B.Tech., Computer Science and Engineering, CGPA: 8.8/10 — *2015–2019*

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Publications

- Woodworth, B., **Patel, K.K.**, Stich, S.U., Dai, Z. Bullins, B., McMahan, B., Shamir, O. & Srebro, N. (2020). Is Local SGD Better than Minibatch SGD? Under Review **ICML'20**. **[Arxiv]**
- Lin, T., Stich, S.U., **Patel, K.K.** & Jaggi, M. (2019). Don't Use Large Mini-Batches, Use Local SGD. **ICLR'20**. **[PDF]**
- Dieuleveut, A. & **Patel, K.K.**(2019). Communication trade-offs for synchronized distributed SGD with large step-size. **NeurIPS'19**. **[PDF]**
- Kapoor, S., **Patel, K.K.**, & Kar, P. (2018). Corruption-tolerant bandit learning. **Machine Learning Journal, Springer**. **[Journal Link][PDF]**

Awards and Achievements

- Recipient of **Honda Young Engineer and Scientist's (Y-E-S) Fellowship 2017**, awarded to 14 undergraduates for excellent research work. Eligible for **7,000$** Y-E-S+ grant for summer'20 in Japan.
- Received **Academic Excellence Award**, 2015 at IIT Kanpur, among the top performing students.
- **Represented India** as a part of the **Youth Delegation to Nepal** organized by the *Ministry of Youth Affairs and Sports*, Government of India.
- Among **top 1%** in all national standard subject tests; selected for **Indian National Chemistry Olympiad**.
- **All India Rank 200** in JEE-Advanced 2015, and **99.9** percentile in JEE-Mains 2015 out of **1.3M** students.

Other Projects

- **ICLR reproducibility challenge** — **CS-433, EPFL**
  Dr. Rüdiger Urbanke, Dr. Martin Jaggi — *November 2018–Jan 2019*
  Reproduced the submission titled, *A re-sizable mini-batch gradient descent based on a multi-armed bandit.* **[Report]**
- **Neural Information Retrieval** — **NLU, IDIAP**
  Dr. Navid Rekabsaz — *Jul 2018–Dec 2018*
  Involved in the creation of a new supervised learning data-set for IR, from a medical database and a novel representation learning algorithms, to improve state-of-the-art retrieval.
- **Analysis of the urban heat effect in Ghent, Belgium** — **Math-342, EPFL**
  Dr. Emeric Thibaud — *Feb 2018–May 2018*
  Used time-series analysis to study and model temperature variation in different parts of Ghent. **[Report]**
- **Sparse learning in humans** — **IIT Kanpur**
  Dr. Devpriya Kumar — *Sep 2017–Nov 2017*
  Studied the similarity between sparse learning in humans and one-shot learning in machines. Replicated a study on a dozen subjects and modeled the behavior using non-parametric Bayesian methods. **[Report]**
- **Paraphrase generation using deep generative models** — **IIT Kanpur**
  Dr. Piyush Rai — *Aug 2017–Nov 2017*

Developed a novel algorithm for generating paraphrases using variational auto-encoders. Studied the limitations of BLEU score for evaluating the task. **[Report]**

- **Customer modelling for banking tasks and services** **Hyderabad**
  3LOQ Labs, BitChemy Ventures *Dec 2016*

  Used multi-class classification and clustering, on bank customers based on purchasing behavior and call history.

- **Sentiment analysis of movie reviews and face recognition using Eigenfaces** **IIT Kanpur**
  Association for computational activities *Jan 2016–April 2016*

Programming and Language Skills

- **Programming Languages: Over 5000 lines** in Python, C, R, LaTeX, HTML-CSS; **Over 1000 lines** in C++, Assembly, Matlab, Sqlite; **Packages:** PyTorch, Scikit, Gensim, NLTK, XGBoost, CVXPY.
- **Natural Languages:** Hindi (Native), English (TOEFL-119/120); Sanskrit (Reading); French (A0-A1).

Relevant Coursework

- **Machine Learning Theory:** Online Learning; Bayesian ML; Optimization for ML (**A***); Convex Optimization; Theory of Machine Learning*.
- **Machine Learning Applications:** Introduction to Machine Learning; Deep Learning; Topics in ML Systems; Computer Vision; Natural Language Processing.
- **Computer Science:** Algorithms; Operating Systems; Databases; Compiler Design; Theory of Computation.
- **Mathematics:** Time Series Analysis; Applied Stochastic Processes; Real Analysis Sequence.
- **Other:** Issues in Linguistics (**A***); Learning, Memory and Cognition (**A***); Computational Cognitive Science. (* Ongoing)

Other Activities and Interests

- **Music:** Four-year professional training in **Hindustani Sangeet** by *Gandharva Sangeet Mahavidyalaya, Mumbai*. Event coordinator for Junoon'16, the fusion rock band competition of Antaragni.
- **Mentoring:** Mentor to first-year computer science students for a project on Competitive ML. Also, a student guide to six students at counselling service, IIT Kanpur.
- **Debating and writing:** Professional debater, participated at major Asian parliamentary debating leagues in India. Also, a core team member for *Vox Populi*: the campus Journalism Society.
- **Community Welfare Activities:** UG head of *Raktarpan* (2016-17): an NGO that works in blood donation. Analyzed electricity consumption in IIT Kanpur, and proposed a plan for solar power generation.
- **Leadership:** Senator at Students' Gymkhana and student nominee to the Departmental Undergraduate Committee, Computer Science. Involved in discussions over major student issues.
- **Hiking and running:** Completed many hikes on the Alps, as well as the Lausanne 20K.