DRAVYANSH SHARMA

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Toyota Technological Institute at Chicago, 6045 S Kenwood Ave, Chicago, IL 60637, USA

EDUCATION

Carnegie Mellon University, Pittsburgh *2019 - 2024*
PhD, Computer Science Department; Prof. Maria-Florina (Nina) Balcan
Thesis: Data-driven algorithm design and principled hyperparameter tuning in machine learning

Indian Institute of Technology Delhi, New Delhi *2011 - 2015*
Bachelor of Technology in Computer Science and Engineering; GPA: 9.8/10 (first in class)

EMPLOYMENT

Postdoctoral researcher
Toyota Technological Institute at Chicago *2024-*

◇ Research on theoretical machine learning and game theory.

Senior Software Engineer, Speech Recognition & Speech Synthesis
Google (London, Mountain View) *2015-2019*

◇ Improved latency and reduced embedded size of Google text-to-speech (TTS) component across ~40 languages, improving quality of over billion daily queries.
◇ Improvements to infrastructure and quality of pronunciation models used by Google's automatic speech recognition (ASR) and TTS systems.
◇ Research on relevant problems in natural language processing; published at top conferences.
◇ Promoted with *Superb* (top 4-5% across Google) rating twice within first three years.
◇ Engineering Manager experience of over a year — managed three engineers and two interns.

Online learning with Bandit Feedback
Google Research, Bangalore *Summer 2022*

◇ Algorithms for hyperparameter tuning in reinforcement learning, with theoretical guarantees.

Information-theoretic Optimal Sensor Placement
Microsoft Research, Redmond *Summer 2014*

◇ Designed, analyzed and tested new efficient and scalable active learning algorithms for optimal deployment of sensors. Obtained improved performance guarantees (published at ICML 2015).

Exact and Approximate Learning of Finite Automata
Max Planck Institute for Software Systems, Germany *Summer 2013*

◇ Worked with Dr. Rupak Majumdar (scientific director, MPI-SWS) on design of black box algorithms for characterizing the states of finite and linear automata.

PUBLICATIONS (⋆ indicates alphabetical author list)

Conferences

⋆ Sharma, D. & Suggala A. Offline-to-online hyperparameter transfer for stochastic bandits. AAAI 2025.

⋆ Balcan, M-F., Seiler C. & Sharma, D. Accelerating ERM for data-driven algorithm design using output-sensitive techniques. NeurIPS 2024.

⋆ Balcan, M-F., Blum, A., Sharma, D. & Zhang, H. *An Analysis of the robustness of non-Lipschitz networks.* NeurIPS 2024 (journal to conference track).

⋆ Balcan, M-F. & Sharma, D. *Learning accurate and interpretable decision trees.* UAI 2024 (**Outstanding student paper award**).

⋆ Sharma, D. *No Internal Regret with Non-convex Loss Functions.* AAAI 2024.

⋆ Balcan, M-F., Pozzi, M. & Sharma, D. *Subsidy for repair in component maintenance games.* EMI/PMC 2024.

⋆ Balcan, M-F., Nguyen, A.T. & Sharma, D. *New Bounds for Hyperparameter Tuning of Regression Problems Across Instances.* NeurIPS 2023.

⋆ Balcan, M-F., Hanneke, S., Pukdee, R. & Sharma, D. *Reliable Learning for Test-time Attacks and Distribution Shift.* NeurIPS 2023.

◇ Sharma, D. & Jones, M. *Efficiently learning the graph for semi-supervised learning.* UAI 2023.

⋆ Balcan, M-F., Khodak, M., Sharma, D., & Talwalkar A. *Provably tuning the ElasticNet across instances.* NeurIPS 2022 [CMU MLD official blog post].

⋆ Balcan, M-F., Blum, A., Hanneke, S. & Sharma, D. *Robustly-reliable learners under poisoning attacks.* COLT 2022.

⋆ Balcan, M-F. & Sharma, D. *Data-driven semi-supervised learning.* NeurIPS 2021. (**Oral**, top 1%)

⋆ Balcan, M-F., Khodak, M., Sharma, D., & Talwalkar A. *Learning-to-learn non-convex piecewise-Lipschitz functions.* NeurIPS 2021.

⋆ Balcan, M-F., Dick, T., & Sharma, D. *Learning piecewise Lipschitz functions in changing environments.* AISTATS 2020.

◇ Sharma D., Wilson M., & Bruguier A. *Better morphology prediction for better speech systems.* Interspeech 2019.

⋆ Sharma D. *On Training and Evaluation of Grapheme-to-Phoneme Mappings with Limited Data.* Proc. Interspeech 2018 (2018): 2858-2862.

◇ Bruguier A., Bakhtin A., & Sharma D. *Dictionary Augmented Sequence-to-Sequence Neural Network for Grapheme to Phoneme Prediction.* Interspeech 2018.

◇ Sharma D., Kapoor A., & Deshpande A. *On greedy maximization of entropy.* ICML 2015.

Journals

⋆ Balcan, M-F., Blum, A., Sharma, D. & Zhang, H. *An Analysis of the robustness of non-Lipschitz networks.* JMLR 2023.

⋆ Maran K., Reddy S. P., Sharma D., & Tripathi A. *Some results on a class of mixed van der Waerden numbers.* Rocky Mountain Journal of Mathematics (2018), 48(3), 885-904.

Workshops

⋆ Du, A., Huang E. & Sharma, D. *Theoretical Analyses of Hyperparameter Selection in Graph-Based Semi-Supervised Learning.* Workshop on Geometry-grounded Representation Learning and Generative Modeling (ICML 2024).

⋆ Balcan, M-F., Seiler, C. & Sharma, D. *Accelerating data-driven algorithm design using output-sensitive techniques.* Workshop on Learnable Optimization (AAAI 2024).

⋆ Balcan, M-F., Dick, T. & Sharma, D. *Shifting regret for tuning combinatorial algorithms with applications to clustering.* Workshop on Learnable Optimization (AAAI 2024), full version AISTATS 2020.

- ⋆ Balcan, M-F., Blum, A., Sharma, D. & Zhang, H. *Can non-Lipschitz networks be robust? The power of abstention and data-driven decision making for robust non-Lipschitz networks.* Socially Responsible Machine Learning Workshop (ICLR 2022) **Oral** (4/28 accepted).
- ◇ Sharma D., Sahai S.Y., Chaudhari N., Antoine Bruguier. *Improved pronunciation prediction accuracy using morphology.* The ACL Special Interest Group on Computational Morphology and Phonology (ACL 2021).
- ◇ Sharma D., Sahai S.Y. *Predicting and Explaining French Grammatical Gender.* The ACL Special Interest Group on Typology (NAACL 2021).

TALKS

- ◇ *Learning accurate and interpretable decision trees.* UAI 2024 Oral; invited talk at CMU AI seminar, Fall 2024.
- ◇ *Reliable learning under adversarial attacks.* CMU Theory Lunch, Spring 2024.
- ◇ *Provably tuning the ElasticNet across instances.* CMU Theory Lunch, Fall 2022; NeurIPS 2022.
- ◇ *Near-optimal robustness for instance targeted poisoning and online meta-learning.* TTIC, Fall 2022.
- ◇ *Data-driven semi-supervised learning.* Scalable Algorithms for Semi-supervised and Unsupervised Learning Workshop 2021 at Google; CMU Theory Lunch; NeurIPS 2021 Oral.
- ◇ *On the power of abstention and data-driven decision making for adversarial robustness.* CMU Theory Lunch, Spring 2021; ICLR 2022 Oral at SRML workshop.
- ◇ *Learning piecewise Lipschitz functions in changing environments.* CMU AI Seminar, AISTATS 2020.

MENTORSHIP

- ◇ Manager to three engineers at Google Speech team, Mountain View.
- ◇ NLP Research with interns at Google, published at Interspeech and ACL.
- ◇ Mentored several graduate and undergraduate students at CMU.
- ◇ First author student-only publications at NAACL and UAI.

TECHNICAL SKILLS

Proficient: C++, Python (TensorFlow, PyTorch), Bash, AWS.
Experienced: Java, SQL, Javascript.

HONORS AND ACHIEVEMENTS

Scholarships and Awards

- ◇ Outstanding Student Paper Award at UAI 2024.
- ◇ Paper selected for Oral presentation (top 3.6% among 744 submissions) at UAI 2024.
- ◇ Paper selected for Oral presentation (top 0.6% among 9122 submissions) at NeurIPS 2021.
- ◇ Paper selected for Oral presentation (top 4 among 28 accepted papers) at ICLR 2022 SRML workshop.
- ◇ First place at YinzOR 2019 (OR conference with participation from top US universities) poster competition for poster titled "Online optimization of piecewise Lipschitz functions in changing environments".
- ◇ Scholarships to attend UAI 2023, UAI 2024 and AAAI 2024.
- ◇ Invited (among 200 researchers worldwide) to attend the 7th Heidelberg Laureate Forum 2019.

- ◇ Sole awardee of the Kalpana Chawla Scholarship 2014 for scientific contributions among over 850 (all students across all departments), by IIT Delhi.
- ◇ Awarded fellowship by Max-Planck-Institute for Software Systems (Kaiserslautern, Germany, 2013).
- ◇ One in 205 students across India to be awarded the Kishore Vaigyanik Protsahan Yojana (KVPY) scholarship 2010 for research aptitude by Department of Science and Technology, Government of India.

Academic and Entrance Tests

- ◇ Ranked first (highest GPA) in Computer Science and Engineering Department class of 2015.
- ◇ Awarded second best 'all-rounder' among all graduating students (across all departments) in 2015.
- ◇ Secured All India Rank 7 in IIT-JEE (Joint Entrance Examination) 2011 among $500,000$ applicants.
- ◇ Twice invited and honored as the Prime Minister's guest at Republic Day of India (2012, 2010) by the Indian Ministry of Education; All India first (second resp.) among junior college (high school) graduates.

National and International Olympiads

- ◇ Won Gold Medal at the 43^{rd} International Chemistry Olympiad (IChO-2011) held at Ankara, Turkey.
- ◇ Among 35 students from all over India to be selected to attend the Orientation-cum-Selection Camp for the International Olympiad of Astronomy and Astrophysics (IOAA) 2011.
- ◇ Obtained State Ranks 1 and 3 in Regional Mathematics Olympiad 2010 and 2009.

SERVICE

Reviewer: NeurIPS, JMLR, COLT, AISTATS, ICLR, UAI, AAAI, ALT, TPAMI, SIMODS, Machine Learning.
Session Chair: AAAI 2025.
Area Chair: ICLR 2023 (Tiny Papers track).
Organized CMU Learning Theory reading group (Spring 2021, Fall 2021, Spring 2022, Fall 2022).

COURSES

Graduate (CMU): Algorithms, Artifical Intelligence, Advanced Topics in Theoretical Machine Learning, Fixed-parameter Tractable Algorithms, Data Mining, Programming Languages
Undergraduate (IIT Delhi): Artifical Intelligence, Machine Learning, Analysis and Design of Algorithms, Theory of Computation, Computational Geometry, Discrete Mathematics, Game Theory, Data Structures, Information Theory, Logic for Computer Science, Operating Systems, Computer Networks, Programming Languages, Cryptography and Computer Security, Computer Architecture