SAMARTH GUPTA

POSITION	: **Data Scientist 2 at Microsoft**
EMAIL	: sidsamarth@gmail.com
WEBPAGE	: sidsamarth.github.io
INTERESTS	: Online Learning, Statistical modeling, Experiment design, Recommendation systems, Model selection in Machine Learning, Optimization, Robust Machine Learning

EDUCATION

AUG 2017 - MAY 2022	**Carnegie Mellon University**, Pittsburgh, PA PhD, Electrical and Computer Engineering Thesis: Structured and Correlated Multi-Armed Bandits: Algorithms, Theory and Applications GPA: **4.0/4.0**
JUL 2012 - JUN 2017	**Indian Institute of Technology Bombay**, Mumbai, India Dual Degree (Bachelor of Technology + Master of Technology in Electrical Engineering) CGPA: **9.01/10**

WORK EXPERIENCE

AUG 2022 -	**Inference optimization and productization of LLMs** **Microsoft**, Redmond, WA | Data Scientist 2, Microsoft Turing (Bing) Working on productization of LLMs for Windows co-pilot, new features in Bing Chat, text prediction in Edge browser (EN and non-EN languages). Performed latency optimizations for generative text prediction scenario in non-EN languages and explored pruning techniques for model compression of language representation models.
AUG 2017 - MAY 2022	**Sequential Decision Making from Noisy and Correlated Observations** **Carnegie Mellon University**, Pittsburgh | *Advisors:* Gauri Joshi, Osman Yağan Developed a novel framework to sequentially select the best action from a set of available actions, where the rewards corresponding to different actions are correlated and noisy. Proposed novel online learning algorithms that exploit the knowledge of correlations. Analyzed the algorithms theoretically and empirically through experiments on recommendation system datasets. Applying this work to the problem of selecting best among the available prediction models in machine learning applications and solving combinatorial online resource allocation problems.

INTERNSHIPS

MAY 2021 - AUG 2021	**Session-Aware Model Selection for Search** **Amazon**, Berkeley, CA | Applied Scientist, Amazon Search Proposed a novel methodology to decide the best available search algorithm for the search query typed in by the customer. Modeled the customer's interaction with the Amazon's search algorithm as a MDP using historical data. Proposed new regularization based solutions to the empirical MDP. The resulted solution effectively combines the existing search algorithms and shows significant performance gain over each of the individual algorithm.
MAY 2019 - AUG 2019	**Uncertainty Aware Metrics and Failsafe Predictions for Self -Driving Vehicles** **Uber ATG**, Pittsburgh, PA | Autonomy Engineer, Prediction Analytics Worked on evaluating the performance of mainline prediction, that predicts the trajectory of actors around the self driving vehicle. Incorporated new performance metrics that account for the uncertainties present in the prediction. Designed a safety oriented deep learning model for trajectory prediction, that activates when the mainline prediction's performance is below par.

RELEVANT SKILLS AND GRADUATE COURSEWORK

SKILLS	C++, C, Python, PyTorch, Tensorflow, SQL, PySpark, Prompt Engineering
CMU	Machine Learning, Advanced Machine Learning, Deep Learning, Foundation of Cloud and ML Infrastructure, Optimization, Estimation Detection and Learning, Martingales: Concentration inequalities and Sequential Analysis
TEACHING ASSISTANT	Machine Learning (Spring 2020), Performance Modeling (Fall 2019, Fall 2018), Markov Chains and Queuing Systems (Spring 2017), Data Analysis and Interpretation (Fall 2016)

PUBLICATIONS

JOURNAL   Haoya Li, **Samarth Gupta**, Hsiang-Fu Yu, Lexing Ying, Inderjit Dhillon "Approximate-Newton policy gradient algorithms". SIAM Journal on Scientific Computing. Link

Samarth Gupta, Gauri Joshi and Osman Yağan "Best-Arm Identification in Correlated Multi-Armed Bandits" IEEE Journal on Selected Areas of Information Theory, Special Issue on Sequential, Active and Reinforcement Learning, 2021. Link

Samarth Gupta, Shreyas Chaudhari, Gauri Joshi and Osman Yağan "Multi-Armed Bandits with Correlated Arms" IEEE Transactions on Information Theory 2021. Preliminary version appeared in RL Theory workshop at ICML 2020. Link

Samarth Gupta, Shreyas Chaudhari, Subhojyoti Mukherjee, Gauri Joshi and Osman Yağan "A unified approach to translate classical bandit algorithms to the structured bandit setting". IEEE Journal on Selected Areas of Information Theory: Estimation and Inference 2020. Link

Samarth Gupta and Sharayu Moharir "Effect of Recommendations on Serving Content with Unknown Demand" in ACM Transactions on Modeling and Performance Evaluation of Computer Systems 2018. Link

Samarth Gupta and Sharayu Moharir "Modeling Request Patterns in VoD Services with Recommendation Systems", Lecture Notes in Computer Science, Volume 10340, 2017. Link

Satish Grandhi, Bo Yang, Christian Spagnol, **Samarth Gupta** and Emanuel Popovici "An EDA Framework for Reliability Estimation and Optimization of Combinational Circuits" Journal of Low Power Electronics, Vol.12, 1-17,2016 Link

CONFERENCE   **Samarth Gupta**, Daniel Hill, Lexing Ying and Inderjit Dhillon "Bayesian regularization of empirical MDPs" Reincarnation Reinforcement Learning workshop at ICLR 2023. Link

Samarth Gupta, Jinhang Zuo, Carlee Joe-Wong, Gauri Joshi and Osman Yağan "Correlated Combinatorial Bandits for Online Resource Allocation" ACM MobiHoc 2022, poster paper in SIGMETRICS 2022, **(recipient of the best poster award).** Link

Yae Jee Cho, **Samarth Gupta**, Gauri Joshi and Osman Yağan "Bandit-based communication-efficient client-selection strategies for federated learning" Asilomar 2020. Link

Samarth Gupta, Shreyas Chaudhari, Subhojyoti Mukherjee, Gauri Joshi and Osman Yağan "A unified approach to translate classical bandit algorithms to structured bandits". ICASSP 2021. Link

Samarth Gupta, Gauri Joshi and Osman Yağan "Correlated Multi-Armed Bandits with Latent Random Source" ICASSP 2020. Link

Samarth Gupta, Gauri Joshi and Osman Yağan "Active Distrbution Learning from Indirect Samples" Allerton Conference on Control, Communication and Computing, 2018. Link

Samarth Gupta and Sharayu Moharir "Effect of Recommendations on Serving Content with Unknown Demand" poster paper in ACM Mobihoc 2017 **(recipient of best poster award).**

Samarth Gupta and Sharayu Moharir "Request Pattern and Caching for VoD Services with Recommendation Systems" in COMSNETS 2017. Link

AWARDS AND HONORS

- Awarded the David H. Barakat and LaVerne Owen-Barakat CIT Dean's Fellowship for 2019-20

- Awarded the CyLab Presidential Fellowship for 2018-19

- Awarded the Carnegie Institute of Technology Dean's Fellowship for 2017-18

- Received the Temasek Foundation LEaRN scholarship for the semester exchange program at Nanyang Technological University in Fall 2015 (Awarded to 54 students across 14 countries)

- Received support from Science Foundation Ireland - International Strategic Cooperation Award to conduct a research internship at University College Cork, Ireland in Summer 2014

- Awarded Merit Certificate from KVS for securing 95.6% in CBSE Intermediate(Grade 12) 2012

- Qualified the Regional Mathematics Olympiad in 2010 and represented Gujarat in Indian National Mathematics Olympiad 2011

- Awarded Merit Certificate from CBSE for securing a CGPA of 10/10 in Matriculation 2010