Subrata Mitra

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Research Interests

Efficient ML, Systems for ML, ML for Systems, Cloud and Distributed Systems.
I am a researcher and engineer who is interested in various aspects of performance and cost optimization in large scale data processing systems, machine-learning training and inference systems. I am also interested in applying ideas from advanced machine learning in designing more efficient systems.

Professional Experience

Senior Research Scientist *August 2022 – Present*
Adobe Research, Bangalore, India

Research Scientist-2 *August 2019 – July 2022*
Adobe Research, Bangalore, India

Research Scientist-1 *February 2017 – July 2019*
Adobe Research, Bangalore, India

Research Intern *Summer 2015, 2014, 2013*
AT&T Research, New Jersey
Microsoft Research, Redmond
Lawrence Livermore National Laboratory, California

Software Engineer *January 2011 – July 2012*
Intel Corporation, Santa Clara, USA

Senior Software Engineer *December 2006 – July 2009*
Atrenta (now Synopsys), Noida, India

Technology Consultant *July 2006 - December 2006*
Price Waterhouse Coopers (PWC), Kolkata, India

Education

Ph.D. in Computer Engineering *December 2016*
Purdue University, West Lafayette, USA

M.S. in Computer Engineering *December 2010*
University of Florida, Gainesville, USA

B.E. in Electronics and Telecommunication Engineering *June 2006*
Jadavpur University, Kolkata, India

Publications

1. Shubham Agarwal*, Sai Sundaresan*, **Subrata Mitra**^{CA}, Debabrata Mahapatra , Archit Gupta, Rounak Sharma, Nirmal Joshua Kapu, Tong Yu, Shiv Saini: **Cache-Craft: Managing Chunk-**

Caches for Efficient Retrieval-Augmented Generation. **SIGMOD 2025**

2. Yiru Chen, Xupeng Li, Jeffrey Tao , Alana Ramjit, Ravi Netravali, **Subrata Mitra**, Aditya Parameswaran, Javad Ghaderi, Dan Rubenstein, Eugene Wu: **Jade: Design Independence Via Physical Visualization Design**. **SIGMOD 2025**

3. Haneen Mohammed, Alexander Yao, Charlie Summers, Hongbin Zhong, Gromit Yeuk-Yin Chan, **Subrata Mitra**, Lampros Flokas, Eugene Wu: **FaDE: More Than a Million What-ifs Per Second**. **VLDB 2025**

4. Chen-Yi Lu, Shubham Agarwal, Md Mehrab Tanjim, Kanak Mahadik, Anup B. Rao, **Subrata Mitra**, Shiv Kumar Saini, Saurabh Bagchi, Somali Chaterji: **RECON: Training-Free Acceleration for Text-to-Image Synthesis with Retrieval of Concept Prompt Trajectories**. **ECCV 2024**

5. Rui Wang, Tong Yu, Ruiyi Zhang, Sungchul Kim, Ryan A. Rossi, Handong Zhao, Junda Wu, **Subrata Mitra**, Lina Yao, Ricardo Henao: **Personalized Federated Learning for Text Classification with Gradient-Free Prompt Tuning**. **NAACL-HLT (Findings) 2024**

6. Shubham Agarwal, **Subrata Mitra**^{CA}, Sarthak Chakraborty, Srikrishna Karanam, Koyel Mukherjee, Shiv Saini: Approximate Caching for Efficiently Serving Diffusion Models. **NSDI 2024**

7. Ghazi Shazan Ahmad, Shubham Agarwal, **Subrata Mitra**^{CA}, Ryan Rossi, Manav Doshi, Vibhor Porwal, Syam Manoj Kumar Paila: ScaleViz: Scaling Visualization Recommendation Models on Large Data. **PAKDD 2024**

8. Raunak Shah, Koyel Mukherjee, Atharv Tyagi, Sai Keerthana Karnam, Dhruv Joshi, Shivam Bhosale, **Subrata Mitra**: R2D2: Reducing Redundancy and Duplication in Data Lakes. **SIGMOD 2024**

9. Jaeho Bang, Gaurav Tarlok Kakkar, Pramod Chunduri, **Subrata Mitra**, Joy Arulraj: SEIDEN: Revisiting Query Processing in Video Database Systems. **VLDB 2023**: 2289-2301

10. Shaddy Garg, **Subrata Mitra**^{CA}, Tong Yu, Yash Gadhia, Arjun Kashettiwar: Reinforced Approximate Exploratory Data Analysis. **AAAI 2023**: 7660-7669

11. Rui Wang, Tong Yu, Junda Wu, Handong Zhao, Sungchul Kim, Ruiyi Zhang, **Subrata Mitra**, Ricardo Henao: Federated Domain Adaptation for Named Entity Recognition via Distilling with Heterogeneous Tag Sets. **ACL 2023**: 7449-7463

12. Gaurav Tarlok Kakkar, Jiashen Cao, Pramod Chunduri, Zhuangdi Xu, Suryatej Reddy Vyalla, Prashanth Dintyala, Anirudh Prabakaran, Jaeho Bang, Aubhro Sengupta, Kaushik Ravichandran, Ishwarya Sivakumar, Aryan Rajoria, Ashmita Raju, Tushar Aggarwal, Abdullah Shah, Sanjana Garg, Shashank Suman, Myna Prasanna Kalluraya, **Subrata Mitra**, Ali Payani, Yao Lu, Umakishore Ramachandran, Joy Arulraj: EVA: An End-to-End Exploratory Video Analytics System. **DEEM@SIGMOD 2023**: 8:1-8:5

13. Aakash Sharma, Vivek M. Bhasi, Sonali Singh, Rishabh Jain, Jashwant Raj Gunasekaran, **Subrata Mitra**, Mahmut Taylan Kandemir, George Kesidis, Chita R. Das: Stash: A Comprehensive Stall-Centric Characterization of Public Cloud VMs for Distributed Deep Learning. **ICDCS 2023**: 1-12

14. Kunjal Panchal, Sunav Choudhary, **Subrata Mitra**, Koyel Mukherjee, Somdeb Sarkhel, Saayan Mitra, Hui Guan: Flash: Concept Drift Adaptation in Federated Learning. **ICML 2023**: 26931-26962

15. Shubham Agarwal, Gromit Yeuk-Yin Chan, Shaddy Garg, Tong Yu, **Subrata Mitra**^{CA}: Fast Natural Language Based Data Exploration with Samples. **SIGMOD Conference Companion 2023**: 155-158

16. Ran Xu, Rakesh Kumar, Pengcheng Wang, Peter Bai, Ganga Meghanath, Somali Chaterji, **Subrata Mitra**, Saurabh Bagchi: ApproxNet: Content and Contention-Aware Video Object Classification System for Embedded Clients. **ACM Trans. Sens. Networks**: 11:1-11:27 (2022)

17. Nikhil Sheoran, **Subrata Mitra**^{CA}, Vibhor Porwal, Siddharth Ghetia, Jatin Varshney, Tung Mai, Anup B. Rao, Vikas Maddukuri: Conditional Generative Model Based Predicate-Aware Query Approximation. **AAAI 2022**: 8259-8266

18. Rui Wang, Tong Yu, Handong Zhao, Sungchul Kim, **Subrata Mitra**, Ruiyi Zhang, Ricardo Henao: Few-Shot Class-Incremental Learning for Named Entity Recognition. **ACL 2022**: 571-582

19. Sheng Yang, Samir Khuller, Sunav Choudhary, **Subrata Mitra**, Kanak Mahadik: Correlated Stochastic Knapsack with a Submodular Objective. **ESA 2022**: 91:1-91:14

20. Azam Ikram, Sarthak Chakraborty, **Subrata Mitra**, Shiv Kumar Saini, Saurabh Bagchi, Murat Kocaoglu: Root Cause Analysis of Failures in Microservices through Causal Discovery. **NeurIPS 2022**

21. Vibhor Porwal, **Subrata Mitra**^{CA}, Fan Du, John Anderson, Nikhil Sheoran, Anup B. Rao, Tung Mai, Gautam Kowshik, Sapthotharan Nair, Sameeksha Arora, Saurabh Mahapatra: Efficient Insights Discovery through Conditional Generative Model based Query Approximation. **SIGMOD 2022**: 2397-2400

22. Shanka Subhra Mondal, Nikhil Sheoran, **Subrata Mitra**^{CA}: Scheduling of Time-Varying Workloads Using Reinforcement Learning. **AAAI 2021**: 9000-9008

23. Sheng Yang, Samir Khuller, Sunav Choudhary, **Subrata Mitra**, Kanak Mahadik: Scheduling ML training on unreliable spot instances. **UCC Companion 2021**: 29:1-29:8

24. Ashraf Mahgoub, Karthick Shankar, **Subrata Mitra**, Ana Klimovic, Somali Chaterji, Saurabh Bagchi: SONIC: Application-aware Data Passing for Chained Serverless Applications. **USENIX Annual Technical Conference 2021**: 285-301

25. Piyush Bagad, **Subrata Mitra**^{CA}, Sunny Dhamnani, Atanu R. Sinha, Raunak Gautam, Haresh Khanna: Data-Sharing Economy: Value-Addition from Data meets Privacy. **WSDM 2021**: 1105-1108

26. Ran Xu, Chen-Lin Zhang, Pengcheng Wang, Jayoung Lee, **Subrata Mitra**, Somali Chaterji, Yin Li, Saurabh Bagchi: ApproxDet: content and contention-aware approximate object detection for mobiles. **SenSys 2020**: 449-462

27. Ashraf Mahgoub, Alexander Medoff, Rakesh Kumar, **Subrata Mitra**, Ana Klimovic, Somali Chaterji, Saurabh Bagchi: OPTIMUSCLOUD: Heterogeneous Configuration Optimization for Distributed Databases in the Cloud. **USENIX Annual Technical Conference 2020**: 189-203

28. **Subrata Mitra**, Shanka Subhra Mondal, Nikhil Sheoran, Neeraj Dhake, Ravinder Nehra, Ramanuja Simha: DeepPlace: Learning to Place Applications in Multi-Tenant Clusters. **APSys 2019**: 61-68

29. Pradeep Dogga, Sandip Chakraborty, **Subrata Mitra**, Ravi Netravali: Edge-based Transcoding for Adaptive Live Video Streaming. **HotEdge 2019**

30. Ashraf Mahgoub, Paul Wood, Alexander Medoff, **Subrata Mitra**, Folker Meyer, Somali Chaterji, Saurabh Bagchi: SOPHIA: Online Reconfiguration of Clustered NoSQL Databases for Time-Varying Workloads. **USENIX Annual Technical Conference 2019**: 223-240

31. Ran Xu, **Subrata Mitra**, Jason Rahman, Peter Bai, Bowen Zhou, Greg Bronevetsky, Saurabh Bagchi: Pythia: Improving Datacenter Utilization via Precise Contention Prediction for Multiple Co-located Workloads. **Middleware 2018**: 146-160

32. Ran Xu, Jinkyu Koo, Rakesh Kumar, Peter Bai, **Subrata Mitra**, Sasa Misailovic, Saurabh Bagchi: VideoChef: Efficient Approximation for Streaming Video Processing Pipelines. **USENIX Annual Technical Conference 2018**: 43-56

33. **Subrata Mitra**, Manish K. Gupta, Sasa Misailovic, Saurabh Bagchi: Phase-aware optimization in approximate computing. **CGO 2017**: 185-196

34. Ashraf Mahgoub, Paul Wood, Sachandhan Ganesh, **Subrata Mitra**, Wolfgang Gerlach, Travis Harrison, Folker Meyer, Ananth Grama, Saurabh Bagchi, Somali Chaterji: Rafiki: a middleware for parameter tuning of NoSQL datastores for dynamic metagenomics workloads. **Middleware 2017**: 28-40

35. **Subrata Mitra**, Rajesh Krishna Panta, Moo-Ryong Ra, Saurabh Bagchi: Partial-parallel-repair (PPR): a distributed technique for repairing erasure coded storage. **EuroSys 2016**: 30:1-30:16

36. **Subrata Mitra**, Suhas Javagal, Amiya Kumar Maji, Todd Gamblin, Adam Moody, Stephen Lien Harrell, Saurabh Bagchi: A Study of Failures in Community Clusters: The Case of Conte. **ISSRE Workshops 2016**: 189-196

37. Tara E. Thomas, Anmol J. Bhattad, **Subrata Mitra**, Saurabh Bagchi: Sirius: Neural Network Based Probabilistic Assertions for Detecting Silent Data Corruption in Parallel Programs. **SRDS 2016**: 41-50

38. **Subrata Mitra**, Greg Bronevetsky, Suhas Javagal, Saurabh Bagchi: Dealing with the Unknown: Resilience to Prediction Errors. **PACT 2015**: 331-342

39. Amiya Kumar Maji, **Subrata Mitra**, Saurabh Bagchi: ICE: An Integrated Configuration Engine for Interference Mitigation in Cloud Services. **ICAC 2015**: 91-100

40. Arnab Raha, **Subrata Mitra**, Vijay Raghunathan, Sanjay G. Rao: VIDalizer: An energy efficient video streamer. **WCNC 2015**: 2233-2238

41. Amiya Kumar Maji, **Subrata Mitra**, Bowen Zhou, Saurabh Bagchi, Akshat Verma: Mitigating interference in cloud services by middleware reconfiguration. **Middleware 2014**: 277-288

42. **Subrata Mitra**, Ignacio Laguna, Dong H. Ahn, Saurabh Bagchi, Martin Schulz, Todd Gamblin: Accurate application progress analysis for large-scale parallel debugging. **PLDI 2014**: 193-203

43. Ignacio Laguna, **Subrata Mitra**, Fahad A. Arshad, Nawanol Theera-Ampornpunt, Zongyang Zhu, Saurabh Bagchi, Samuel P. Midkiff, Michael Kistler, Ahmed Gheith: Automatic Problem Localization via Multi-dimensional Metric Profiling. **SRDS 2013**: 121-132

Patents

1. INTERMEDIATE NOISE RETRIEVAL FOR IMAGE GENERATION. US Patent Application #18637024

2. USING REINFORCEMENT LEARNING TO RECOMMEND DATA VISUALIZATIONS. US Patent Application # 18668888

3. DATA EXPLORATION USING NATURAL LANGUAGE WITH DATA SAMPLING. US Patent Application # 18675930

4. DYNAMICALLY MANAGING PROMPTS AND MODEL PARAMETERS FOR HIGH-THROUGHPUT TEXT-TO-IMAGE INFERENCE SERVING. US Patent Application #18808654

5. TEACHING A MACHINE CLASSIFIER TO RECOGNIZE A NEW CLASS. US Patent # 11995403

6. SELF-LEARNING SCHEDULER FOR APPLICATION ORCHESTRATION ON SHARED COMPUTE CLUSTER. US Patent# 11989647

7. SCHEDULING JOBS ON INTERRUPTIBLE CLOUD COMPUTING INSTANCES. US Patent # 11915054

8. MANAGING MACHINE LEARNING MODEL RECONSTRUCTION. US Patent # 11829239

9. SYSTEM AND METHOD FOR TRAINING AND SELECTING EQUIVALENCE CLASS PREDICTION MODULES FOR RESOURCE USAGE PREDICTION. US Patent # 11847496

10. QUERY-ORIENTED APPROXIMATE QUERY PROCESSING BASED ON MACHINE LEARNING TECHNIQUES. US Patent # 11544281

11. Cooperative Platform For Generating, Securing, And Verifying Device Graphs And Contributions To Device Graphs. US Patent # 11115204
12. A TENANT-SIDE METHOD TO AUTOMATICALLY DETECT AND ATTRIBUTE NOISY-NEIGHBOR INDUCED PERFORMANCE DEGRADATION USING MACHINE LEARNING. US Patent # 11086646
13. TENANT-SIDE DETECTION, CLASSIFICATION, AND MITIGATION OF NOISY-NEIGHBOR-INDUCED PERFORMANCE DEGRADATION. US Patent # 11947986
14. Parallel partial repair of storage. US Patent # 10740198B2
15. Integrated configuration engine for interference mitigation in cloud computing. US Patent # 10310883B2
16. System and methods for video analysis. US Patent App. US20230262237A1
17. Shared Resource Interference Detection involving a Virtual Machine Container. US Patent App. US20230222005A1
18. Scheduling and Control of Executable Jobs Over Compute Instances. US Patent App. US20230168941A1
19. Facilitating generation of representative data. US Patent App. US20230153448A1
20. Workload Equivalence Class Identification For Resource Usage Prediction. US Patent App. US20220129316A1
21. Workload Equivalence Class Identification For Resource Usage Prediction. US Patent App. 17/082,413

Recent PC and Reviewing

- USENIX Annual Technical Conference: 2025, 2024 (Best Reviewer Award), 2023, 2022:
- ACM Middleware: 2024, 2022
- AAAI: 2023, 2022