

# Spandan Senapati

CS PH.D. STUDENT, UNIVERSITY OF SOUTHERN CALIFORNIA

Los Angeles, California, USA

✉ ssenapat@usc.edu | 🏠 fellow4.github.io | 🎓 Spandan Senapati

## Education

### University of Southern California

Los Angeles, California

PH.D. IN COMPUTER SCIENCE, ADVISED BY PROF. HAIPENG LUO AND PROF. VATSAL SHARAN

Aug 2023 - Present

- Research Interests: Statistical Learning Theory, Online Learning, Trustworthy Machine Learning, Generative Modeling

### Indian Institute of Technology Kanpur

Kanpur, Uttar Pradesh

BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE AND ENGINEERING

July 2018 - May 2022

- Cumulative Performance Index (CPI): **9.1/10.0** (graduated with **Distinction**)
- Awarded **Proficiency Medal** at the 55th Convocation for the best undergraduate project done by a graduating student in the CSE department
- **Academic Excellence Award** (2018-19, 2019-20): Awarded for excellent academic performance in an academic year

## Experience

### Indian Institute of Technology Kanpur

SPiN Lab, IIT Kanpur

GRADUATE RESEARCH ASSISTANT, ADVISOR: PROF. KETAN RAJAWAT

Aug 2022 - May 2023

- Project on Sharpened Lazy Incremental Quasi-Newton (SLIQN) method, the first algorithm with an  $\mathcal{O}(d^2)$  per-iteration complexity and an explicit non-asymptotic superlinear convergence rate
- Paper accepted to AISTATS 2024 (Valencia, Spain)

### Tata Institute of Fundamental Research

Remote

INTERNSHIP, ADVISOR: PROF. RAHUL VAZE

Aug 2022 - May 2023

- Project on Online Convex Optimization with Switching Cost and Delayed Gradients. Proposed an algorithm and a novel analysis technique to bound its competitive ratio for the OCO-S problem with delayed gradients. Derived nearly matching lower bounds for the problem
- Paper accepted to IFIP Performance 2023 (Chicago, USA)

### Related Search Team - Microsoft Bing

Microsoft IDC, Hyderabad

DATA SCIENTIST INTERN, RS STCI TEAM

May 2021 - July 2021

- Project on Topics in Organised Map of Suggestions (TOMS). Developed an efficient clustering algorithm and built an interface which automated the clustering process and allowed doing several large-scale experiments seamlessly
- Offered a Pre-Placement offer (PPO) for a full-time data scientist position

## Publications and Preprints

### Efficient Swap Multicalibration of Elicitable Properties

[Arxiv]

LUNJIA HU <sup>$\alpha-\beta$</sup> , HAIPENG LUO <sup>$\alpha-\beta$</sup> , SPANDAN SENAPATI <sup>$\alpha-\beta$</sup> , VATSAL SHARAN <sup>$\alpha-\beta$</sup>

Nov 2025

Under submission

### Improved Bounds for Swap Multicalibration and Swap Omniprediction

[Arxiv]

HAIPENG LUO <sup>$\alpha-\beta$</sup> , SPANDAN SENAPATI <sup>$\alpha-\beta$</sup> , VATSAL SHARAN <sup>$\alpha-\beta$</sup>

May 2025

Annual Conference on Neural Information Processing Systems (NeurIPS), 2025 (**Spotlight presentation**)

### Simultaneous Swap Regret Minimization via KL-Calibration

[Arxiv]

HAIPENG LUO <sup>$\alpha-\beta$</sup> , SPANDAN SENAPATI <sup>$\alpha-\beta$</sup> , VATSAL SHARAN <sup>$\alpha-\beta$</sup>

Feb 2025

Annual Conference on Neural Information Processing Systems (NeurIPS), 2025 (**Spotlight presentation**)

### Optimal Multiclass U-Calibration Error and Beyond

[Arxiv][Openreview]

HAIPENG LUO <sup>$\alpha-\beta$</sup> , SPANDAN SENAPATI <sup>$\alpha-\beta$</sup> , VATSAL SHARAN <sup>$\alpha-\beta$</sup>

Sep 2024

Annual Conference on Neural Information Processing Systems (NeurIPS), 2024

### Sharpened Lazy Incremental Quasi-Newton Method

[PMLR][Arxiv]

AAKASH LAHOTI\*, SPANDAN SENAPATI\*, KETAN RAJAWAT, ALEC KOPPEL

Jan 2024

International Conference on Artificial Intelligence and Statistics (AISTATS)

### Online Convex Optimization with Switching Cost and Delayed Gradients

[PER][PEVA][Arxiv]

SPANDAN SENAPATI, RAHUL VAZE

Aug 2023

IFIP Performance 2023. Full paper: Elsevier Performance Evaluation (PEVA), Extended abstract: ACM SIGMETRICS Performance Evaluation Review (PER)

Note:  $\alpha - \beta$  denotes alphabetical ordering, which is custom in theoretical computer science research; \* denotes equal contribution

## Report

Fall'23 **Failure Cases of Empirical Risk Minimization (ERM) and Structural Risk Minimization (SRM)**, CSCI 699

[\[Report\]](#)

## Honors & Awards

2022	<b>Proficiency Medal</b> , Best undergraduate project done by a graduating student from the CSE department	<a href="#">IIT Kanpur, India</a>
2018, 19	<b>Academic Excellence Award</b> , For excellent academic performance in an academic year	<a href="#">IIT Kanpur, India</a>
2018	<b>All India Rank 161</b> , Joint Entrance Examination Main, among 1.5 Million Candidates	<a href="#">India</a>
2018	<b>All India Rank 191</b> , Joint Entrance Examination Advanced, among 200000 Candidates	<a href="#">India</a>
2017	<b>All India Rank 24</b> , KVPY Scholarship, Indian Institute of Science and Government of India	<a href="#">Bangalore, India</a>
2016	<b>NTSE Scholar</b> , Awarded to the top 1000 students in the nation by the Government of India	<a href="#">India</a>
2016	<b>IJSO OCSC</b> , Selected for the team selection camp of the International Junior Science Olympiad(top 35 India)	<a href="#">Mumbai, India</a>
2017, 18	<b>National Top 1%</b> , National Standard Examination in Physics(NSEP) among 200000 Candidates	<a href="#">India</a>
2018	<b>National Top 1%</b> , National Standard Examination in Chemistry(NSEC) among 200000 Candidates	<a href="#">India</a>
2017, 18	<b>State Top 1%</b> , National Standard Examination in Astronomy(NSEA)	<a href="#">India</a>
2017	<b>3rd in State</b> , Represented Odisha State in the Indian National Maths Olympiad(INMO)	<a href="#">India</a>
2016	<b>State Top 35</b> , Represented Odisha State in the Indian National Maths Olympiad (INMO)	<a href="#">India</a>

## Travel Grants

2024	<b>GSG Professional Development Fund</b> , Issued by USC
2023	<b>National Science Foundation (NSF) Student Travel Award</b> , Issued by IFIP Performance 2023

## Talks

2023	<b>IFIP Performance 2023</b> , Online Convex Optimization with Switching Cost and Delayed Gradients	<a href="#">Chicago, USA</a>
2024	<b>USC Theory Lunch</b> , Optimal Multiclass U-Calibration Error and Beyond	<a href="#">Los Angeles, USA</a>

## Teaching

Fall'24	<b>Teaching Assistant</b> , Theoretical Machine Learning (CSCI 678)	<a href="#">USC</a>
---------	---	---------------------

## Skills

<b>Programming</b>	C, C++, Python
<b>Machine Learning Framework</b>	Pytorch

## Reviewing

<b>Machine Learning</b>	Annual Conference on Neural Information Processing Systems (NeurIPS) 2024, 2025 ( <b>Top Reviewer</b> )
<b>Theoretical Computer Science</b>	Annual Symposium on Foundations of Computer Science (FOCS) 2025 (External Reviewer)

## Service

### SHINE Mentor

USC SUMMER HIGH SCHOOL INTENSIVE IN NEXT GENERATION ENGINEERING (SHINE)

[June 2024 - July 2024](#)

- Mentored a high school student in building an online learning-based program that can beat a human user repeatedly in a game of rock-paper-scissors

### Coordinator

SPECIAL INTEREST GROUP IN MACHINE LEARNING(SIGML)

[IIT Kanpur](#)

[May 2021 - Nov 2021](#)

- Responsible for the smooth conduction of talks in different active areas of research in Machine Learning

## Student Guide

IIT Kanpur

### COUNSELLING SERVICE

July, 2019 - July 2020

- Responsible for the guidance and mentorship at a personal level of 5 freshman undergraduates and the smooth conduction of various events in the Orientation Session for the incoming Batch of Y19

## Project Mentor

IIT Kanpur

### ASSOCIATION OF COMPUTING ACTIVITIES (ACA)

Jan 2020 - Jun 2020

- Introduced Inference algorithms in Bayesian ML to a group of freshman undergraduates, and prepared assignments to track progress