

# SUBHRAJYOTY ROY

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🌐 [Portfolio Website](#)

## CURRENT POSITION

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- *Postdoctoral researcher* at the Department of Statistics & Data Science in the **Washington University, St. Louis**.

## RESEARCH INTERESTS

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- Robust statistical inference, divergences, minimum divergence estimation.
- Dependent data analysis, spatial analysis, spatiotemporal analysis.
- Statistical methods for Deep learning, AI safety, and trustworthiness.

## EDUCATION

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|-------------|--|--|
| 2021 - 2025 | <b>Ph.D. in Statistics</b><br><b>Thesis:</b> Robust Matrix Factorization using the Density Power Divergence and its Applications.<br><b>Supervisors:</b> Ayanendranath Basu and Abhik Ghosh. | <b>Indian Statistical Institute, Kolkata</b> |
| 2019-2021   | <b>Masters of Statistics (M.Stat.)</b><br>Grade: 93.8%, Financial Statistics specialization, Ranked <i>1st</i> .   | <b>Indian Statistical Institute, Kolkata</b> |
| 2016 - 2019 | <b>Bachelor of Statistics (B.Stat.)</b><br>Grade: 93.6%, Ranked <i>2nd</i> .   | <b>Indian Statistical Institute, Kolkata</b> |
| 2014 - 2016 | <b>Higher Secondary (WBCHSE)</b><br>Grade: 93.4%, District Rank <i>2nd</i> .   | <b>Nimta High School, Kolkata</b>            |
| 2014        | <b>Secondary (WBCSSE)</b><br>Grade: 94.57%, State Rank <i>20th</i> .   | <b>Nimta High School, Kolkata</b>            |

## PROFESSIONAL EXPERIENCE

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|                            |   |  |
|----------------------------|---|--|
| July, 2025-                | <b>Postdoctoral Researcher</b><br><b>Department of Statistics and Data Science, Washington University at St. Louis</b><br><b>Research Mentor:</b> Prof. Debashis Mondal.  |  |
| July, 2022<br>- June, 2025 | <b>Principal Information Researcher</b><br>Directed applied AI research initiatives, development of RAG-based agentic chatbots (SysCloud Sky & Scout), architecting a centralized control flow system that reduced API rate-limit errors by 90%, etc.                                       | <b>SysCloud Inc.</b>                             |
| May, 2024<br>- July, 2024  | <b>Mentor</b><br>Course instructor for <i>Mathematics for Artificial Intelligence</i> module.<br>Received a consistent rating of 4.5+.  | <b>Great Learning Education Series Pvt. Ltd.</b> |
| July, 2021<br>- June, 2022 | <b>Data Scientist</b><br>Developed reinforcement learning models to optimize Google Ads bidding strategies, and designed a unified, scalable system architecture for cloud data backup and restoration that drove expansion across major SaaS platforms (Salesforce, Slack, HubSpot, etc.). | <b>SysCloud Inc.</b>                             |

|                    |  |                                    |
|--------------------|--|------------------------------------|
| 2020<br>May - June | <b>Data Scientist Intern</b><br>Sentiment analysis to obtain the impact of COVID-19 on the aviation industry from tweets.  | <b>General Electric (Aviation)</b> |
| 2019<br>May - June | <b>Data Scientist Intern</b><br>Developed cost optimization techniques for backup and restore workflows. Working on phishing email detection problem using a combination of NLP and deep learning. | <b>SysCloud Inc.</b>               |

## PUBLICATIONS

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### Journal Articles

1. **Roy, S.**, Sarkar, A., Ghosh, A., & Basu, A. (2026). Asymptotic Breakdown Point Analysis for a General Class of Minimum Divergence Estimators. *Bernoulli*, 32(1), 698-722. [\[Link\]](#).
2. **Roy, S.**, Basu, A., & Ghosh, A. (2024). Robust Principal Component Analysis using Density Power Divergence. *Journal of Machine Learning Research*, 25(324), 1-40. [\[Link\]](#).
3. **Roy, S.**, Ghosh, A., & Basu, A. (2024). Robust singular value decomposition with application to video surveillance background modelling. *Statistics and Computing*, 34(5), 178. [\[Link\]](#).
4. Pyne, A., **Roy, S.**, Ghosh, A., & Basu, A. (2024). Robust and efficient estimation in ordinal response models using the density power divergence. *Statistics*, 58(3), 481-520. [\[Link\]](#).
5. Bhaduri, R., **Roy, S.**, & Pal, S. K. (2022). Rough-Fuzzy CPD: a gradual change point detection algorithm. *Journal of Data, Information and Management*, 4(3), 243-266. [\[Link\]](#).
6. Ghatak, A., Singh Patel, S., Bonnerjee, S., & **Roy, S.** (2022). A generalized epidemiological model with dynamic and asymptomatic population. *Statistical Methods in Medical Research*, 31(11), 2137-2163. [\[Link\]](#).
7. **Roy, S.**, Sengupta, D., Rudra, K., & Saha, U. S. (2020). Analysis of Pollution Patterns in Regions of Kolkata. *Calcutta Statistical Association Bulletin*, 72(2), 133-170. [\[Link\]](#).
8. Mukherjee, D., Dalal, A., & **Roy, S.** (2019). Feasibility of Transparent Price Discovery in Tea through Auction in India. *Commodity Insights Yearbook (MCX)*, 44-52. [\[Link\]](#).

### Preprints

1. **Roy, S.** & Mondal, D. (2026). Asymptotics of Spatial Graph Laplacians via Sparse Networks under Coulomb's Interaction Law. (*in preparation*).
2. Mondal, D. & **Roy, S.** (2026). Conditional Formulation of Gaussian Systems on Spatial Networks over Irregularly Distributed Point Sites. (*in preparation*).
3. **Roy, S.**, Basu, S., Ghosh, A., & Basu, A. (2026). Universally Optimal Robustness-Efficiency Tradeoffs under Minimum Divergence Frameworks. (*in preparation*).
4. **Roy, S.**, Deb, S., Karmakar, S., & Roy, R. (2026). Nonparametric regression of spatio-temporal data using infinite-dimensional covariates. *arXiv preprint* arXiv:2604.01593. [\[Link\]](#). (*under review*).
5. **Roy, S.**, Ghosh, A., & Basu, A. (2025). Robust Rank Estimation for Noisy Matrices. *arXiv preprint* arXiv:2510.19583. [\[Link\]](#). (*under review*).
6. Bonnerjee, S., **Roy, S.**, & Karmakar, S. (2025). Fast segmentation of watermarked texts from large language models through epidemic change-points framework. [\[Link\]](#) (*Major Revision from JASA*).

7. Jana, S., **Roy, S.**, Ghosh, A., & Basu, A. (2025). Asymptotic breakdown point analysis of the minimum density power divergence estimator under independent non-homogeneous setups. *arXiv preprint* arXiv:2508.12426. [\[Link\]](#). (Major Revision from Test).
8. **Roy, S.**, Basu, S., Ghosh, A., & Basu, A. (2025). Characterization of Generalized Alpha-Beta Divergence and Associated Entropy Measures. *arXiv preprint* arXiv:2507.04637. [\[Link\]](#). (under review).
9. Deb, S., Neves, C., & **Roy, S.** (2024). Nonparametric quantile regression for spatio-temporal processes. *arXiv preprint* arXiv:2405.13783. [\[Link\]](#). (under review).
10. **Roy, S.** (2024). Trustworthy Dimensionality Reduction. *arXiv preprint* arXiv:2405.05868. [\[Link\]](#).
11. Bhaduri, R., Bonnerjee, S., & **Roy, S.** (2019). Onset detection: A new approach to QBH system. *arXiv preprint* arXiv:1908.07409. [\[Link\]](#).

## SEMINARS, CONFERENCES & LECTURES

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### Invited Talks

|      |   |   |
|------|---|---|
| 2026 | <i>IISA Conference (upcoming)</i>           | Varanasi, India                         |
| 2026 | <i>EcoSta Conference (upcoming)</i>         | Kyoto, Japan                            |
| 2026 | <i>Statistics &amp; Data Seminar Series</i> | Saint Louis University, USA             |
| 2025 | <i>Graduate Student Seminar Series</i>      | Washington University in St. Louis, USA |

### Contributed Talks

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|------|--|--|
| 2026 | <i>Poster Presentation</i>                                   | AISTATS, Marrakesh, Morocco (unable to attend) |
| 2025 | <i>International Conference in Robust Statistics (ICORS)</i> | Stresa, Italy                                  |
| 2024 | <i>Student Paper Competition</i>                             | IISA Conference, Cochin, India                 |
| 2024 | <i>IMS Asia Pacific Rim Meeting</i>                          | Melbourne, Australia                           |

### Others

|            |  |                                       |
|------------|--|---------------------------------------|
| Fall, 2022 | <i>Guest Lecture on Robust Statistics</i>            | Indian Statistical Institute, Kolkata |
| 2021       | <i>Prasanta Chandra Mahalanobis memorial lecture</i> | Indian Statistical Institute, Kolkata |
| 2019       | <i>D. Basu memorial lecture</i>                      | Indian Statistical Institute, Kolkata |

## TEACHING ACTIVITIES

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|            |  |   |
|------------|--|---|
| Spring, 26 | <i>SDS 5140 Advanced Linear Models</i>         | Washington University in St. Louis        |
| Fall, 25   | <i>SDS 4010 Introduction to Probability</i>    | Washington University in St. Louis        |
| Summer, 24 | <i>Mathematics for Artificial Intelligence</i> | Great Learning Education Series Pvt. Ltd. |

## ADDITIONAL ACTIVITIES

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- Maintain a substack newsletter [StatWizard](#) with 200+ subscribers.
- **Session chair:**
  1. IMS Asia-Pacific Rim Meeting, 2024.
- **Reviewer:**
  1. Scientific Reports.
  2. Applied Stochastic Models in Business and Industry.

## PROJECTS, SOFTWARE AND PACKAGES

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|      |   |                                |
|------|---|--------------------------------|
| 2025 | <b>handanim - Contributor &amp; Maintainer</b><br>A Python library to create whiteboard-style, hand-drawn animations for educational videos, tutorials or data storytelling.  | <a href="#">Github Link</a>    |
| 2024 | <b>Langchain - Contributor</b><br>Framework for developing applications powered by large language models  | <a href="#">Github Commits</a> |
| 2023 | <b>Multi PDF QueryBot - Developer &amp; Maintainer</b><br>A streamlit application to chat with PDF documents using RAG and Large language models. Uses a locally hosted Chroma vector database, SQLite for metadata storage, and Claude for access to foundational LLM.   | <a href="#">Github Link</a>    |
| 2023 | <b>callgrid-reader - Developer &amp; Maintainer</b><br>A typescript utility package to read, parse and analyze callgrind files for profiling analysis of codes  | <a href="#">NPM Link</a>       |
| 2023 | <b>decompy - Developer &amp; Maintainer</b><br>Python package for multiple robust matrix and tensor decomposition algorithms  | <a href="#">PyPI Link</a>      |
| 2022 | <b>roufcp - Developer &amp; Maintainer</b><br>Python package implementing a gradual changepoint detection algorithm using rough-fuzzy set theory  | <a href="#">PyPI Link</a>      |
| 2021 | <b>rsvddpd - Developer &amp; Maintainer</b><br>R package to perform Robust SVD using Density Power Divergence   | <a href="#">CRAN Link</a>      |
| 2020 | <b>COVID-19 Tracker: A Dashboard for prediction and control assistance</b><br>Developed a dashboard to visualize the COVID-19 situation in different states of India. It dynamically estimates the time-varying reproduction rate and prediction of COVID-19 spread for various lockdown scenarios for district levels in India, based on a modified eSIR model. The project was funded by the Indian Insitute of Management, Vishakhapatnam. |                                |
| 2019 | <b>Analysis of Climber's challenges in scaling Mount Rainier</b><br>Modelling of climber's success rate in climbing Mount Rainier based on weather modelling. Modelling of climber's team sizes for insights about mountaineering-based local economy.  | <a href="#">Report Link</a>    |
| 2019 | <b>An Introduction of Causal Inference using Direct Acyclic Graph</b><br>Understanding of the setup and assumptions for causal inference. Estimating the effect of intervention using frontdoor and backdoor criterion, simulations and applications to real-world datasets to estimate causality.  | <a href="#">Report Link</a>    |
| 2018 | <b>Chatbot using Seq2Seq Attention Mechanism</b><br>It is a chatbot created with a seq2seq neural network with a basic attention mechanism, trained with the Cornell Movie Corpus dataset.  | <a href="#">Github Link</a>    |

## ACCOLADES

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|           |   |                                       |
|-----------|---|---------------------------------------|
| 2026      | <b>Winner of I2DB Datathon Scientific Symposium</b>   | WashU Medicine                        |
| 2024      | <b>Nominated for the Student Paper Award</b>  | IISA Conference 2024                  |
| 2024      | <b>AWS Cloud Practitioner Certification</b>   | Amazon Web Services (AWS)             |
| 2023      | <b>AIR 6 at National Eligibility Test</b><br>Council of Scientific and Industrial Research (CSIR), Govt. of India |                                       |
| 2022      | <b>Nominated for P. C. Mahalanobis Memorial Gold Medal</b><br>Indian Statistical Institute, Kolkata               |                                       |
| 2022      | <b>J. K. Ghosh Memorial Gold Medal</b>  | Indian Statistical Institute, Kolkata |
| 2016-2021 | <b>Dean's list of toppers</b>   | Indian Statistical Institute, Kolkata |
| 2020      | <b>90 percentile at GRE General Test</b>  | Educational Testing Service (ETS)     |

|      |  |                                       |
|------|--|---------------------------------------|
| 2020 | <b>Nikhilesh Bhattacharya Memorial Gold Medal</b>            | Indian Statistical Institute, Kolkata |
| 2020 | <b>D. Basu Memorial Gold Medal</b>                           | Indian Statistical Institute, Kolkata |
| 2019 | <b>93 percentile at GRE Mathematics Subject Test</b>         | Educational Testing Service (ETS)     |
| 2018 | <b>1st Quartile at Simon Marais Mathematical Competition</b> |                                       |
|      | Australian Mathematical Science Institute                    |                                       |
| 2016 | <b>AIR 1 in Undergraduate Entrance Exam</b>                  |                                       |
|      | Institute of Mathematics and Application, Bhubaneswar        |                                       |

## SKILLS

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|---------------------------------|--|
| <b>Programming Technologies</b> | R, Python, SQL, PHP, JavaScript (NestJS, NodeJS, React, NextJS).                               |
| <b>Tools</b>                    | AWS (S3, Lambda, ECS, Sagemaker, Bedrock), Docker, Langchain, Langflow.<br>MS-Office, $\LaTeX$ |

## REFERENCES

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- **Debashis Mondal.** Associate Professor, Washington University in St. Louis, USA.  
*Email:* [mondal@wustl.edu](mailto:mondal@wustl.edu)
- **Ayanendranath Basu.** Professor, Indian Statistical Institute, Kolkata.  
*Email:* [ayanbasu@isical.ac.in](mailto:ayanbasu@isical.ac.in)
- **Diganta Mukherjee.** Professor, Indian Statistical Institute, Kolkata.  
*Email:* [diganta@isical.ac.in](mailto:diganta@isical.ac.in)
- **Soudeep Deb.** Associate Professor, Indian Institute of Management, Bangalore.  
*Email:* [soudeep@iimb.ac.in](mailto:soudeep@iimb.ac.in)
- **Vijay Krishna.** CEO, SysCloud Inc.  
*Email:* [vijay@syscloudsoftware.com](mailto:vijay@syscloudsoftware.com)

*I certify that the information provided above is true and accurate to the best of my knowledge<sup>1</sup>*

— Subhrajyoty Roy

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<sup>1</sup>Last updated on June 4, 2026