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SHIVAM KUMAR

EMPLOYMENT **University of Chicago** Chicago, USA
Principal Researcher (Postdoc) 2025 - present
• Advisor: Prof. Nabarun Deb.
• Research Focus: Optimal transport, Tensor estimation, DNN theory.

EDUCATION **University of Notre Dame** Notre Dame, USA
Ph.D. Statistics 2020 - 2025
• Advisors: Prof. Lizhen Lin, Prof. Daren Wang.
• Research Focus: Statistical ML, Non-parametric Statistics, Change point.

Visva Bharati Santiniketan, India
Integrated M.Sc. Mathematics 2015 - 2020
• Advisors: Prof. Swapan Kumar Pandit, Prof. Issan Patri.
• GPA: 7.78/10.00.

RESEARCH INTERESTS Functional data analysis, causal inference, statistical learning theory, change point detection in time series, network analysis, tensors, non-parametric statistics, and Optimal transport.

PUBLICATIONS OR PREPRINTS

1. **Shivam Kumar**, Yun Yang, Lizhen Lin. *A Likelihood Based Approach to Distribution Regression Using Conditional Deep Generative Models*. **ICML (2025)**, arXiv preprint arXiv:[2410.02025](https://arxiv.org/abs/2410.02025), 2025.
2. **Shivam Kumar**, Haotian Xu, Carlos-Misael Madrid-Padilla, Yuehaw Khoo, Oscar Hernan Madrid Padilla, Daren Wang. *Bias-variance Tradeoff in Tensor Estimation*. arXiv preprint arXiv:[2509.17382](https://arxiv.org/abs/2509.17382), 2025.
3. **Shivam Kumar**, Haotian Xu, Haeran Cho, Daren Wang. *Estimation and Inference for Change Points in Functional Regression Time Series*. **Under Review**, arXiv preprint arXiv:[2405.05459](https://arxiv.org/abs/2405.05459), 2024.
4. **Shivam Kumar**, Yixin Wang, Lizhen Lin. *Statistical Foundation of Matching Flow Based Generative Models*. **In Progress**, 2025+.

Instructor:

Statistics for Life Sciences	Undergraduate [Class Size: 65]	Spring 2024
Applied Math Methods Tutorial	Undergraduate [14]	Spring 2023

Assistant:

TEACHING	Applied Probability	Graduate [Class Size: 14/32/27/28]	Fall 2024/3/2/1
	Actuarial Modeling I	Graduate [15]	Fall 2024
	Ethics and Policy in Data Science	Graduate (Online Masters) [31]	Summer 2024
	Time Series Analysis	Graduate [37]	Fall 2023
	Artificial Neural Networks	Undergraduate [48]	Spring 2023
	Applied Bayesian Statistics	Undergraduate [11]	Fall 2022
	Introduction to Probability	Undergraduate [46/73]	Fall 2022, Spring 2021
	Mathematical Statistics	Undergraduate [25/35]	Spring 2022, Fall 2021
	Probability and Statistics	Undergraduate (Engineering) [171]	Spring 2022

PROFESSIONAL EXPERIENCES	IBM Research Lab Dublin (Ireland) Summer 2024
	<ul style="list-style-type: none"> Developed and enhanced statistical models for multimodal longitudinal time series. Implemented these models on healthcare datasets to perform multitask inference for biomedical research (on the SUERO Project).
	Indian Institute of Engineering Science & Technology Shibpur (India) Summer 2019
	<ul style="list-style-type: none"> Modeled heavy metal pathways in anaerobic bacteria from harsh environments. Computed energetics and pathways for acetylene conversion to acetaldehyde via DFT-based methods.
	Chennai Mathematical Institute Chennai (India) Summer 2018
	<ul style="list-style-type: none"> Reproduced static and dynamic models for Gram-negative bacterial cell walls. Designed multilayer models to study and validate the mechanical properties of Gram-positive bacterial cell walls.
	Bose Institute Kolkata (India) Summer 2017
	<ul style="list-style-type: none"> Developed and implemented model to simulate shock waves with FCT algorithm. Extended the research to explore applications in Magneto Hydrodynamics.
AWARDS AND HONORS	<ul style="list-style-type: none"> Edison Innovation Fellowship 2024.08-2025.05 Notre Dame IDEA Center fellowship supporting training in research innovation, entrepreneurship, and the principles of deep-tech commercialization, focusing on generating real-world impact from academic research. IISA Student Paper and Poster Competition 2024.12 & 2025.06 Competitive grant awarded by International Indian Statistical Association to support attendance and presentation at the 2024 conference. SIAM Student Travel Award 2024.08 Competitive grant awarded by SIAM to support attendance and presentation at the Mathematics of Data Science (MDS) 2024 conference. ACMS GSG Professional Development Award (twice) 2024.05 Awarded financial support to present at the Joint Statistical Meetings 2024 in Portland. ISBA Student Travel Award 2024.03 Competitive grant awarded by NSF to support presentation at the ISBA World Meeting. CSIR Junior Research Fellowship, Govt. of India (unclaimed) 2019, 2020 Awarded through a competitive exam, achieving 99.78 percentile (twice) among 40,000 examinees to support doctoral education in mathematics in India. INSPIRE Scholarship for Higher Education, Govt. of India 2015-2020 A merit-based scholarship for less than 1% of high school students nationwide for college education, with additional funding for undergraduate research. Science Academies Summer Research Fellowship 2019 Awarded jointly by the three national science academies of India.
PRESENTATIONS AND TALKS	<ul style="list-style-type: none"> Joint Statistical Meeting, Nashville (USA). 2025.08 International Indian Statistical Association Conference, Lincoln (USA). 2025.06 International Indian Statistical Association Conference, CUSAT (India). 2024.12 SIAM Conference on Mathematics of Data Science, Atlanta (USA). 2024.10 SIAM Great Lakes Annual Meeting, Hammond (USA). 2024.10 Joint Statistical Meeting, Portland (USA). 2024.08 IBM Dublin Research Lab, Dublin (Ireland). 2024.07
SELECTED SHORT PROJECTS	Knowledge Conflict Evaluation Dublin, Ireland Summer 2024
	<ul style="list-style-type: none"> Contributed to the first stage of a two-stage pipeline to evaluate knowledge conflicts in a Wikipedia-based dataset using the IBM Granite Foundation model. Developed evaluation metrics to assess the accuracy and reliability of detected conflicts, ensuring robust model performance.

Patterned Vegetation Modeling | Notre Dame, USA Spring 2021

- Built a reaction-advection-diffusion stochastic PDE model to investigate patterned vegetation dynamics.
- Analyzed the resilience of these patterns in response to climate variability and environmental stressors.

Signboard Transliteration | Notre Dame, USA Spring 2021

- Developed a two-stage signboard text transliteration system from vernacular languages to English using attention models.
- Integrated and optimized the first stage of the transliteration pipeline to improve overall system performance.

Knowledge Graph Alignment | Notre Dame, USA Fall 2020

- Collaborated on cross-lingual knowledge graph alignment using Graphlets and a Graph Matching Neural Network on the DBP15K dataset.
- Developed alignment strategies, analyzed model performance, and presented findings to collaborators.

TECHNICAL
SKILLS

Languages: Hindi, English, Bengali.

Programming: Python, R, C, FORTRAN, \LaTeX , C++.

Scientific Computing: MATLAB, Mathematica, Matplotlib, NumPy, PyTorch, scikit-learn.

PROFESSIONAL
MEMBERSHIP

- American Statistical Association.
- Society for Industrial and Applied Mathematics.
- International Indian Statistical Association.
- Institute of Mathematical Statistics.
- Institute for Operations Research and the Management Sciences.

SERVICE

- **Mentoring:** Mentored over 10 undergraduates in transitioning to quality graduate programs at Notre Dame and Visva Bharati.
- **Leadership:** As Vice-President for SIAM at ND, organized workshops, discussion panels, and fostered interdisciplinary collaboration within the SIAM community at Notre Dame. As a Graduate Orientation Ambassador, planned and implemented comprehensive introductions to campus and graduate studies. Advised and judged for the American Statistical Association Data Fest at Notre Dame.
- **Volunteer:** Tutor at Robinson Community Learning Center, Notre Dame.
- **College Council:** Student member, College of Science, University of Notre Dame.
- **Academic Referee:** Annals of Statistics, ICLR, Journal of Computational and Graphical Statistics, Journal of the Korean Statistical Society.

REFERENCES

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| <ul style="list-style-type: none">• Prof. Nabarun Deb
Econometrics and Statistics,
Booth School of Business,
University of Chicago,
Chicago, IL, USA.
nabarun.deb@chicagobooth.edu | <ul style="list-style-type: none">• Prof Lizhen Lin,
Department of Mathematics,
University of Maryland,
College Park, MD, USA.
lizhen01@umd.edu |
| <ul style="list-style-type: none">• Dr. Daren Wang
Department of Mathematics,
University of California San Diego,
La Jolla, CA, USA.
daw040@ucsd.edu | <ul style="list-style-type: none">• Prof. Fang Liu
Department of ACMS,
University of Notre Dame,
Notre Dame, IN, USA.
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