Siddhaarth Sarkar

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Education

Carnegie Mellon University **August 2020 - May 2025**
PhD; Dept. of Statistics and Data Science
Advised by Dr. Arun Kuchibhotla

Indian Statistical Institute, Kolkata **July 2018 - May 2020**
Master of Statistics: Theoretical Statistics Specialization

Indian Statistical Institute, Kolkata **July 2015 - May 2018**
Bachelor of Statistics

Skills

Languages
R, Python, Excel, MATLAB, PostgreSQL, TensorFlow

Projects

Assumption lean inference **August 2023 - present**
Inference based on confidence sets for distributions
- Developing methods to provide confidence sets with minimal assumptions for any general class of functionals.

Monotonic regression (`https://arxiv.org/pdf/2310.20058`) **April 2023 - present**
New Asymptotic Limit Theory and Inference Methods
- Presented some new results for monotone regression
- Provided asymptotically valid confidence intervals that are uniformly valid over a large class of distributions.

Conformal inference (`https://arxiv.org/abs/2304.06158`) **Oct 2022 - present**
Achieving coverage guarantees for a data-dependent coverage level
- Developed new conformal methods allowing practitioners to update the miscoverage level of a prediction set at any stage (even *after* the computation of the prediction set). Traditional methods do not accomplish this, where the miscoverage level is data-independent.

Random forests and decision trees **Jul 2022 - present**
Consistency and inference for density estimation via random forests
- Proved consistency results for density estimation random forests/trees under general regularity conditions on the target density.
- Explored providing uncertainty quantification for density estimates obtained from the random forests/tree

Spatio temporal methods **Dec 2020 - Jan 2022**
Inferring trajectories of under-ice Argo floats
- Proposed a state-space modeling approach to infer the missing trajectory of an under-ice float.
- Used an efficient Kalman smoother algorithm that leverages temperature and salinity information.

Network theory **Aug 2019 - Dec 2020**
Graphon estimation and community detection under missing data setup
- Developed methodology for community detection where not all edges of the network are observed.
- Proved consistency of methods developed under different regiments of missing data.
- Provided insights into graphon estimation and found sufficient conditions to learn parameters from missing data.

Causal inference with network interference **May 2019 - Dec 2020**
Design of experiments for the identification and estimation of peer effects
- Designed a randomized design scheme derived from a binary LP, enabling estimation of peer influence parameters.
- Explored simultaneous identifiability issues and any arbitrary neighborhood interference function estimation.

Papers Presented

Joint Statistical Meetings, Toronto **Aug 2023**

Post-selection Inference for Conformal Prediction: Trading off Coverage for Precision.

Contributed papers in "Nonparametric inference and decision making".

IISA Conference, Mumbai **Dec 2019**

Design of experiments for the identification and estimation of peer effects.

Student poster presentation.

Achievements

D. Basu Memorial Gold Medal Award **2019**

for outstanding seminar as well as best performance in B.Stat. (Hons.) Programme.

- Title of seminar: ***False discovery rates: A powerful multiple testing tool***

KVPY Scholarship **2015**

funded by ***Department of Science and Technology, Govt. of India***

- One of the 1065 students selected.