Sayar Karmakar

University of Florida
Department of Statistics
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Gainesville, FL 32601

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Employment

(Aug 2018-Current) Assistant Professor of Statistics, University of Florida

Education

Ph.D., Statistics, University of Chicago, June 2018 - Supervised by Dr. Wei Biao Wu

Master of Statistics, Indian Statistical Institute, 2013.

Bachelor of Statistics , Indian Statistical Institute, 2011.

Research Interests

Time-series, Econometrics, Multivariate and high-dimensional Statistics, Neural Networks, Game theory

Research Grants Awarded

1. NSF DMS ATD program 2124222 New algorithms for inference and predictions on large geospatial datasets. 2021-24. Role- Solo P.I. $200,000.

   Link: https://www.nsf.gov/awardsearch/showAward?AWD_ID=2124222&HistoricalAwards=false

2. Start-up grant from University of Florida. Project name: High dimensional inference for dependent data. Role- Solo P.I. $163,000

3. AMS Simons Travel Grant for 2021-2024. $6000

4. UFII Seed Grant award 2022: 'Using AI to assess behavior and its relation to internalizing and substance use' . Co-PI Peter Kvam. $30,000

Research Publications

Updates: https://sayarkarmakar.github.io.

Published Journal Articles

1. Simultaneous inference for time-varying models: **Sayar Karmakar**, Stefan Richter, Wei Biao Wu; *Journal of Econometrics* Volume 227, Issue 2, April 2022, Pages 408-428.

   Link: https://doi.org/10.1016/j.jeconom.2021.03.002

2. Optimal Gaussian approximation for multiple time-series: **Sayar Karmakar**, Wei Biao Wu; *Statistica Sinica* 30, 1399-1417 (2020) Presented in Statistica Sinica Invited Papers Session JSM 2020.

   Link: https://doi.org/10.5705/ss.202017.0303
   Arxiv version: https://arxiv.org/abs/2001.10164

3. Shrinkage estimation with singular priors and an application to small area estimation. Ryumei Nakada (Graduate student), Tatsuya Kubokawa, Malay Ghosh and **Sayar Karmakar**. *Journal of Multivariate Analysis* Volume 183, May 2021

   Link: `https://doi.org/10.1016/j.jmva.2021.104726`

4. Long term prediction intervals of economic time-series: Marek Chudy*, **Sayar Karmakar***, Wei Biao Wu; *Empirical Economics* 58, 191-222 (2020) [* Alphabetical order]

   Link: `https://doi.org/10.1007/s00181-019-01689-2`

5. Bayesian modelling of time-varying conditional heteroscedasticity **Sayar Karmakar**, Arkaprava Roy. *Bayesian Analysis*, 1(1), 1-29, 2021.

   Link: `https://doi.org/10.1214/21-BA1267`

6. Time-varying auto-regressive models for count time-series: Arkaprava Roy, **Sayar Karmakar** *Electronic Journal of Statistics* 15 (1) 2905 - 2938, 2021

   Link: `https://doi.org/10.1214/21-EJS1851`

7. Long-term prediction intervals with many covariates **Sayar Karmakar**, Marek Chudy and Wei Biao Wu; To appear at *Journal of Time-series Analysis*. An earlier version was accepted for invited session on SWEET pricing at International Symposium of Forecasting. Invited session on SWEET pricing.

   Link: `https://doi.org/10.1111/jtsa.12629`

8. Forecasting Output Growth of Advanced Economies Over Eight Centuries: The Role of Gold Market Volatility as a Proxy of Global Uncertainty. Afees A. Salisu, Rangan Gupta, **Sayar Karmakar** and Sonali Das. *Resources Policy.* Volume 75, March 2022, 102527

   Link: `https://doi.org/10.1016/j.resourpol.2021.102527`

9. Bitcoin Mining Activity and Volatility Dynamics in the Power Market: **Sayar Karmakar**, Riza Demirer and Rangan Gupta. *Economics Letters*.Volume 209, December 2021, 110111

   Link: `https://doi.org/10.1016/j.econlet.2021.110111`

   This attracted an interview at Revealnews

10. The regular stochastic block model on several-community networks: **Sayar Karmakar**, Moumanti Podder (Being revised at Statistics and Probability Letters).

    Link: `https://arxiv.org/abs/2002.05577`

11. Provable Neural Training of a ReLU Gate with Iterative Non-Gradient Methods: **Sayar Karmakar**, Anirbit Mukherjee. *Neural Networks*. Volume 151, July 2022, Pages 264-275

    Link: `https://doi.org/10.1016/j.neunet.2022.03.040`

12. Model-free time-aggregated predictions for econometric datasets: Kejin Wu (Graduate student) **Sayar Karmakar**. Accepted at *Forecasting.* Top 10 Feature Papers.

    Link: `https://doi.org/10.3390/forecast3040055`

13. The impact of climate change on a university campus' energy use: use of statistical analysis and building characteristics. Haekyung Im (Graduate Student), Ravi Srinivasan, Ruth L. Steiner, **Sayar Karmakar**, Daniel Maxwell. *Buildings.* 2022, 12(2), 108.

    Link: `https://www.mdpi.com/2075-5309/12/2/108`

14. A model-free approach to do long-term volatility forecasting and its variants. Kejin Wu (Graduate student) **Sayar Karmakar**. *Financial Innovation*. 9, Article number: 59 (2023)

    Link: `https://doi.org/10.1186/s40854-023-00466-6`

15. Depth-2 Neural Networks Under a Data-Poisoning Attack **Sayar Karmakar**, Anirbit Mukherjee, Theodore Papamarkou. *Neurocomputing*,Volume 532, 1 May 2023, Pages 56-66

    Link: `https://doi.org/10.1016/j.neucom.2023.02.034`

16. A novel spatio-temporal clustering algorithm with applications on COVID-19 data from the United States. Soudeep Deb. **Sayar Karmakar**. (Alphabetical order) To appear at *Computational Statistics and Data Analysis*

    Link: `https://doi.org/10.1016/j.csda.2023.107810`

17. Climate Risks and Forecastability of the Trading Volume of Gold: Evidence from an INGARCH Model. **Sayar Karmakar**, Rangan Gupta, Oguzhan Cepni, Lavinia Rognone. *Resources Policy*. Volume 82, May 2023, 103438

    Link: `https://doi.org/10.1016/j.resourpol.2023.103438`

18. Are Real Interest Rates a Monetary Phenomenon? Evidence from 700 Years of Data. Vasilios Plakandaras, Rangan Gupta, **Sayar Karmakar**, Mark Wohar. *Research in International Business and Finance*. Volume 66, October 2023, 102010

    Link: `https://www.sciencedirect.com/science/article/abs/pii/S0275531923001368`

19. An NLP-assisted Bayesian time-series analysis for prevalence of cyberbullying on Twitter during COVID-19 pandemic. Christopher Perez (Undergraduate student), **Sayar Karmakar**. *Social Network Analysis and Mining.* 13, Article number: 51 (2023).

    Link: `https://doi.org/10.1007/s13278-023-01053-4`

20. On a class of probabilistic cellular automata with size-3 neighbourhood and their applications in percolation games Dhruv Bhasin (Graduate student), **Sayar Karmakar**, Moumanti Podder, Souvik Roy.

    (Major revision requested from Electronic Journal of Probability)

    Link: https://arxiv.org/abs/2208.11670

21. Safe Havens, Machine Learning, and the Sources of Geopolitical Risk: A Forecasting Analysis Using Over a Century of Data. Rangan Gupta, **Sayar Karmakar**, Christian Pierdzioch (Alphabetical order). To appear at Computational Economics.

    Link: `https://sayarkarmakar.github.io/publications/safehavens.pdf`

22. Stock Market Bubbles and the Forecastability of Gold Returns (and Volatility). David Gabauer, Rangan Gupta, **Sayar Karmakar**, Joshua Nielsen (Alphabetical order).

    Link: `https://www.up.ac.za/media/shared/61/WP/wp_2022_28.zp220424.pdf`

    Revision request from Journal of Commodity Markets

Published Peer-reviewed Conference Articles

1. Time Series-based Malware Detection using Hardware Performance Counters: Abraham Kuruvilla (Graduate student), **Sayar Karmakar** and Kanad Basu. *Proceedings of IEEE International Symposium on Hardware Oriented Security and Trust (HOST) 2021.* (Acceptance rate 28/130)

   DOI:`https://ieeexplore.ieee.org/document/9702291`

2. Understanding the Rise of Twitter-based cyberbullying due to COVID-19through comprehensive statistical evaluation: **Sayar Karmakar** and Sanchari Das. *Proceedings of the 54th Hawaii International Conference on System Sciences*, 2521-2531

3. Evaluating the impact of covid-19 on cyberbullying through bayesian trend analysis: **Sayar Karmakar** and Sanchari Das: *Proceedings of European Interdisciplinary Cybersecurity Conference*, 1-6, November 2020. DOI: `https://doi.org/10.1145/3424954.3424960`

4. Change-Point Analysis of Cyberbullying-Related Twitter Discussions During COVID-19 Sanchari Das, Andrew Kim and **Sayar Karmakar** (Corresponding Author) Accepted for

   16th Annual Social Informatics Research Symposium, (Sociotechnical Change Agents: ICTs, Sustainability, and Global Challenges) 2020.

   Poster: 15th International Workshop on Security (IWSEC 2020)

   Link: `https://arxiv.org/abs/2008.13613`

Submitted Articles

1. Capacity of DeepONets in solving Differential Equations. Pulkit Goplani (Graduate student), **Sayar Karmakar**, Anirbit Mukherjee

   Link: `https://arxiv.org/abs/2205.11359`

2. An Empirical Study of the Occurrence of Heavy-Tails in Training a ReLU Gate **Sayar Karmakar**, Anirbit Mukherjee.

3. Ergodicity of a generalized probabilistic cellular automaton with parity-based neighbourhoods Dhruv Bhasin (Graduate student), **Sayar Karmakar**, Moumanti Podder, Souvik Roy.

   Link: `https://arxiv.org/abs/2212.01753`

4. Consistent estimation in Potts model. **Sayar Karmakar**, Somabha Mukherjee, Sumit Mukherjee, Moumanti Podder.

5. The spread of an epidemic: a game-theoretic approach. **Sayar Karmakar**, Moumanti Podder, Souvik Roy, Soumyarup Sadhukhan

   Link: `http://arxiv.org/abs/2303.09771`

6. Phase transition for percolation games on rooted Galton-Watson tree. **Sayar Karmakar**, Moumanti Podder, Souvik Roy, Soumyarup Sadhukhan

   Link:`http://arxiv.org/abs/2303.11402`

7. Gaussian Approximation For Non-stationary Time Series with Optimal Rate and Explicit Construction. Soham Bonnerjee (Graduate student), **Sayar Karmakar**, Wei Biao Wu

8. OGE: Attack on Binary Neural Networks via Adversarial Bit Flipping. Shamik Kundu (Graduate student), Sanjay Das (Graduate student), **Sayar Karmakar**, Kanad Basu, Arnab Raha, Georgios Makris.

9. GARHCX-NoVaS: A Model-free Approach to Incorporate Exogenous Variables. Kejin Wu (Graduate student), **Sayar Karmakar**

10. Climate Risks and Stock Market Volatility Over a Century of Data in an Emerging Country: The Case of South Africa. Kejin Wu (Graduate student), **Sayar Karmakar**, Rangan Gupta, Christian Pierdzioch.

Presentations and Talks

Invited talk with discussion: High-Dimensional Ising model-based graph estimation for spatial binary Data: A Variational Bayes Approach. JSM Toronto Aug 2023

Invited talk: Gaussian approximation for nonstationary time-series with explicit construction. Ecosta CMStatistics Tokyo, Aug 2023

Invited talk: Changepoint detection via testing for similarity of paired networks. NESS. Boston June 2023

Invited talk: Prediction Interval for high-dimensional regression with dependent errors. Colorado, June 2023. IISA 2023

Invited talk: Comprehensive simultaneous inference on trend-cycle model with application on temperature data. IISA Bangalore. Dec 2022

Invited lecture: Modern Nonparametric Statistics. IISER Pune. Dec 2022

Invited talk: Iowa State Department of Statistics colloquium. Oct 24. ARCH, GARCH models- Estimation, Inference and Prediction.

Invited talk: Capacity bounds of DeepONet. Sep 26-30. Siam Mathematics of Data Science conference.

Invited talk: JSM 2022. Simultaneous inference for time-varying models

Invited talk: StatFin 2022. 30 June 2022. Indian Statistical Institute, Bangalore. Topic: TBD

Invited talk: IIT ISM Dhanbad. Special invited talk in celebration of 'National Statistics Day' India

Invited talk: Ecosta 2022 Kyoto Japan. July 2022

Invited talk: 2022 Algorithms for Threat Detection and Second Graph Theoretical Methods for Blockchain Data Analysis Workshop. A novel spatiotemporal algorithm and its application on analyzing COVID-19 incidence rate.

Invited talk: UPSTAT 2022. ASA Buffalo chapter. May 2022

Invited talk: ISNPS (International symposium on non-parametric statistics) Cyprus 2020 June Cancelled. Postponed to 2022 Summer. Topic: Synchronization of Change point for multi-variate and high-dimensional timeseries

Invited talk: CFE CMStatistics 2021 December. Long term prediction interval with many covariates.

STEMS 2022: Chennai Mathematical Institute. Learning dependence independently

Invited Poster: 2021 October NSF-NBER conference on time-series econometrics. Rice University. Long term prediction interval with many covariates.

Invited talk: International Chinese Statistical Association Virtual September 2021. Bayesian time-varying models.

Invited talk: University of South Carolina Statistics Department. ARCH-GARCH: Estimation, Inference and Predictions. September 2021

Invited talk: IIM Bangalore, Decision sciences department. ARCH-GARCH: Estimation, Inference and Predictions. July 2021.

Invited talk: Hong Kong EcoSta CMStatistics: Session organizer on high-dimensional and multivariate time-series. 2021 June. Postponed from 2020 June.

Invited talk: Cheenta Statistics Department. Online talk on time-series for Statistics undergraduates. May 2021.

Invited talk: International Conference on Time Series and Forecasting. ITISE-2021. Gran Canaria (Spain). Topic: Long term forecasting for high-dimensional regression under dependence. Cancelled.

Invited talk: University of Pittsburgh, March 2021. Time-varying models and applications, A frequentist and a bayesian overview

Talk at Hawaii International Conference on System Science 54 (peer-reviewed): Hawaii, 2021 January Understanding the Rise of Twitter-based cyberbullying due to COVID-19through comprehensive statistical evaluation:

Invited talk: Post-regularized prediction intervals for high dimensional VAR process. CFE CMStatistics. Virtual 2020 December

Talk at European Interdisciplinary Cybersecurity Conference (Peer reviewed) : 2020 November. Evaluating the impact of covid-19 on cyberbullying through bayesian trend analysis

Contributed talk at One world symposium August 2020. Virtual. Optimal Gaussian approximation and applications.

Invited talk: University of Florida Biostatistics seminar talk: 2020 August. Time-varying models and its applications. A frequentist and a bayesian overview

Invited talk: ISBIS July 2020: (International Society for Business and Industrial Statistics) Cancelled/Postponed

Invited talk: Spring Research conference, Michigan, 2020 May Cancelled

Invited talk in student seminar: Texas A&M. April 2020 Cancelled

Invited talk: Post-regularized prediction intervals for high dimensional VAR process. IISA IIT Mumbai 2019 December

Invited talk: Change-point synchronization for multiple and high-dimensional time series. CFE CM-Statistics. London 2019 December

Invited talk: Illinois Institute of Technology colloquium: Gaussian approximation for multiple series and its applications. October 2019.

Seminar talk: Indian statistical Institute: Gaussian approximation for multiple series and its applications. September 2019.

Invited talk: Michigan State University Seminar talk: Gaussian approximation for multiple series and its applications. September 2019.

Contributed talk: Comprehensive inference on trend-cycle model. Colorado. JSM 2019.

Contributed talk: (peer-reviewed acceptance): Post-regularized prediction intervals for VAR models. IMS New researcher conference.

Invited talk: Simultaneous inference on time-varying models. IIM Bangalore July 2019.

Invited talk: Prediction intervals for high dimensional regression. 3rd international conference on economics and statistics. Taichung Ecosta 2019 June.

Talk at SWEET pricing invited session: (peer-reviewed acceptance) Prediction intervals for high dimensional regression. Thessaloniki ISF 2019.

Contributed poster: Time-aggregated forecasting for ultra high dimensional regression under dependence. Symposium on Data Science and Statistics, Seattle May 2019.

Invited talk: Long-term forecasting in high dimensional regression. Florida ASA Chapter. February 2019.

Contributed talk: Comprehensive simultaneous inference on time-varying models. Triennial symposium, Kolkata, December 2018

Invited talk: Comprehensive simultaneous inference on time-varying models. CMStatistics/ERCIM, University of Pisa , Italy (December 2018)

Poster: Comprehensive simultaneous inference on time-varying models. NSF-NBER peer reviewed conference. University of California San Diego September 2018

Poster: Optimal Gaussian approximation. International Indian Statistical Association, University of Florida, Gainesville. May 2018. Best poster award

Poster: Simultaneous inference on time-varying models. New Aspects of Statistics, Financial Econometrics, and Data Science. Booth School, University of Chicago. May 2018

Invited Talk: Simultaneous inference on time-varying models. *Indian Statistical Institute, Kolkata* Mar 2018

Invited Job Talk: Simultaneous inference on time-varying models *University of Florida, SAMSI, Temple University, Old Dominion University, University of Michigan, Bucknell University, Texas Christian University, University of Wisconsin, University of Nevada, Reno*

Invited Talk: Simultaneous confidence bands in time-varying coefficient models. *University of Illinois at Chicago* Oct 2017

Talk: Robust two-sample mean tests in presence of outliers. *Indian Statistical Institute* May, 2013

Poster: Clustering approach to identify clones in tumors *Young Statistician's conference* Melbourne, Feb 2013. 2nd prize winner.

Talk: High exome mutational burden in 58 African Americans with persistent extreme blood pressure *Institute of Genetic Medicine* Baltimore, June 2012

Poster: Statistical Methods to Identify clonal variations present in Tumour *Conference on Contemporary Issues and Applications of Statistics*, Kolkata, January 2012

Poster: Identification and differentiation between driver and passenger mutation applying clustering algorithm on next gen sequencing data. *61st ASHG meeting* Montreal, Canada, October 2011.

Talk: A brief review of geometric probability. *D. Basu Memorial Award*, Indian Statistical Institute, Kolkata, September 2011

Session Organizer- By invitation

2021 July Ecosta CMStatistics Seoul, South Korea. (Session chair)

2021 Dec CFE CMStatistics King's College London

2022 June Ecosta CMStatistics Kyoto, Japan (Invited to organize)

Session Chair

JSM 2019 Chair for Dimension-reduction and high-dimensional data, Denver, Colorado.

Editorial work

Editorial board

ACM Transactions on Probabilistic Machine Learning. 2023-

Journal of Multivariate analysis: Early career advisory board. (2021-24)

Journals

Annals of Statistics (5), The Journal of the American Statistical Association (1), Journal of Econometrics (1), Journal of Machine Learning Research (1), Journal of Computational and Graphical Statistics (2), Electronic Journal of Statistics (3), Econometric Theory (1), Linear Algebra and its Applications (3), Statistics and Probability letters (3), Sankhya B (3), Journal of Multivariate Analysis (3), Journal of Statistical Planning and Inference(1), Journal of Statistical Computation and Simulation (1), Environmetrics (1), STAT (3), Statistical Modelling (1), Financial Innovation (1), Mathematics (7), Sankhya A (4), IEEE Transactions on Information Theory (1), Journal of Quantitative Economics (1), Algorithms (1), Population Health Metrics (1), Spatial and Spatiotemporal Epidemiology (1), Statistical Papers (1), Statistical Analysis and Data Mining (2), Mathematics and Statistics (1), Cybernetics and Systems (1), Managerial Finance (2), Applied Sciences (1), International Journal of Environmental Research and Public Health (1), SIAM Journal on Mathematics of Data Science (1), Asian Journal of Probability and Statistics (1), Quantitative Finance (1), Frontiers in Big Data (1), Annals of Financial Economics (2), L4DC (1), Neural Networks (1), Journal of Forecasting (1)

Scientific program committee member

CFE CMStatistics 2022, UK London

CYBER 2022, The Seventh International Conference on Cyber-Technologies and Cyber-Systems

ICCM 2022, International Conference on Clinical Methodology

Blockchain & Cryptography Congress (B2C' 2022), 16-18 November 2022, Barcelona, Spain

CYBER 2021, The Sixth International Conference on Cyber-Technologies and Cyber-Systems

Grant review

NSERC Discovery Grants - Govt. of Canada

Student paper/poster award committee

New England Statistical Society symposium 2023.

IISA 2023

ASA Section on Statistical Learning and Data Science for JSM 2021

Student advising

Member of PhD dissertation committee:

Ruoyang Zhang (Department of Statistics)

Haekyung Im (School of Building construction)

Heshan Aravinda (Department of Mathematics)

Siphumlile Mangisa (External: Department of Statistics, Nelson Mandela University)

Yue Bai (Department of Statistics)

Yifeng Tian ((Department of Design, construction and planning)

Graduate student advising

At University of Florida: Yiqiao Zhang, Suman Bhattacharya, Somnath Bhadra, Hongqiang Sun

External: Kejin Wu (UC San Diego), Nilanjan Chakraborty (Michigan State University), Jiefu Zhou (Columbia University), Soham Bonnerjee (University of Chicago), Yuhan Liu (University of Chicago)

Statistics Consulting Experience

Effect of native /sign language on gesture pattern: Dinah Shender (Co-leader), Sayar Karmakar (Co-leader), Ye Tian, Fan Yang and Nuoya Zhou.

Grave Dating and Gender Roles: Mengyu Xu (Leader), Sayar Karmakar, Bo Luan

Effect of Rurality on Degree Attainment in College: Sayar Karmakar (Leader), Shan Lu

Chinese restaurant process to study inventor-patent relationships: Sayar Karmakar (Leader), Guanzhou Chen, Jinhan Ahn, Yangze Zhou.

Awards and Honors

Statistics

2022 June 30-July 2 Invited talk for Statfin- A finance focused conference hosted in ISI Bangalore.

2022 June Special Invited talk at IIT ISM Dhanbad on 'National Statistics Day- India' as a young prominent statistician.

2021 Kutner Junior/Isolated faculty Travel award $1000

Early Career advisory board- Editorial team- Journal of Multivariate Analysis

'Optimal Gaussian Approximation for multiple time-series' paper presented in Statistica Sinica Invited session JSM 2020.

Travel award for attending IMS New Researcher Conference, 2019, Colorado: $833.

Travel award for attending Symposium on Data Science and Statistics, Seattle 2019: $500

Best poster award IISA 2018 conference, Gainesville

Travel award for attending IISA 2018 conference: $350

Graduate travel award UChicago Grad Gargoyle 2017-18: $600

Runners up in the Statistics Consulting Program 2016-17 at University of Chicago.

Nominated for best tutor in Statistics in both 2014-15 and 2015-16 at the Core college tutoring program.

Debesh Kamal Scholarship, 2013: $1600

Deans list, Indian Statistical Institute, 2008-2013

2nd prize in poster, Young Statistician's Conference, Melbourne. 2013, (Organized by SSAI): $200 AUD

Travel award, ISI for attending YSC, Melbourne : $1200

USPROC 4th prize, 2011 (Organized by Consortium for the Advancement of Undergraduate Statistics Education, http://www.causeweb.org/usproc)

Travel award, ISI for research internship in JHU: $1500

Travel award, ISI for attending ASHG 2011 Montreal: $1500

IAS Summer Fellowship, 2011 for a project on Geometric Probability under Prof. A. M. Mathai.

Others

KVPY scholarship, 2009-2013: $1000 for each year 2009-2011 $1500 for each year 2011-2013.

Rank 3, Regional Maths Olympiad, West Bengal, India 2012

Inspire Scholarship, 2010-2013

NCERT Scholarship, 2006-2008

Rank 1, National level Science Talent by "Jatiyo Biggyan Porishod" 2005

Top ranks Statewise Mathematics talent by ADTM 2002-2007

University Service

Undergraduate committee, Department of Statistics, 2023-

Faculty Judge ASA Datafest 2023 held at University of FLorida Biostatistics Department.

Department colloquium organizing committee, Department of Statistics, 2022-2023.

Bylaws Committee, Department of Statistics, 2022-2023

Faculty advisor, UF Quantitative Finance Club, 2022-2023

Department colloquium organizing committee, Department of Statistics, 2019-2020.

Faculty supervisor, Indian Graduate Students Association, 2020-21.

University Marshall, , Department of Statistics, 2019 May graduation

Last updated: September 6, 2023