Saptadeep Biswas

Research Scholar · Operation Research · Supply Chain Optimization · Artificial Intelligence · Disaster Risk Reduction

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Research Interest

As a dedicated researcher in Operations Research, Supply Chain Optimization, and Artificial Intelligence, I focus on creating innovative solutions to address complex challenges in disaster risk reduction and management. My doctoral research, "A Study on Intelligent Disaster Management: Implementing AI-based Prediction and Logistics Optimization Techniques," has equipped me with an in-depth understanding of how computational techniques can significantly enhance crisis decision-making processes. Through this work, I have explored the integration of AI methodologies and optimization techniques with operational strategies to optimize resource allocation and logistics during disasters, leading to multiple peer-reviewed publications in high-impact journals.

My research interests lie in advancing machine learning, optimization algorithms, and mathematical modelling to improve predictive analytics and operational frameworks for climate resilience. I am particularly motivated to collaborate with interdisciplinary teams to further the understanding of resilience to climate change and develop scalable solutions applicable to real-world scenarios. My goal is to contribute to both the academic community and the broader field of climate resilience through impactful research and pioneering methodologies.

Education

National Institute of Technology Agartala, India — *Coursework Grade: **CGPA (8.07/10)***

PhD Scholar, DST INSPIRE Fellow — *2021 - Present*

Thesis Topic: A Study on Intelligent Disaster Management: Implementing AI-based Prediction and Logistics Optimization Techniques

Supervisor: Prof. Uttam Kumar Bera (Professor, Department of Mathematics, National Institute of Technology Agartala, India. Email: bera_uttam@yahoo.co.in / uttam.math@nita.ac.in)

Outcome: Four peer-reviewed SCIE publications in high-ranked journals (all Q1) with impact factors of 9.7 (2023), 4.2 (2024), 4.5 (2024), and 4.4 (2024). Additionally, I have one peer-reviewed publication in Scopus with a CiteScore of 2.0 (2023), one peer-reviewed journal paper, one book chapter published by Springer, participation in one international symposium, and two international conferences. I have also established four international collaborations with leading researchers worldwide. I was awarded the INSPIRE Fellowship from the Department of Science and Technology, India, which covers all my expenses for the entire duration of my PhD program, lasting five years.

Institute of Advanced Studies in Education (IASE), Tripura, India — *Grade: **CGPA (9.16/10)***

Two-year Full Time B.Ed. programme — *2018 - 2020*

National Institute of Technology Agartala, India — *Grade: **CGPA (7.87/10)***

BS-MS Dual Degree in Mathematics — *2013-2018*

Internships / Research Projects

Indian Institute of Technology Guwahati — *Guwahati, India*

Summer Internship Program - 2016 — *2016*

- Under the guidance of Prof. Natesan Srinivasan at Department of Mathematics.
- Project titled "Efficient Numerical Methods for Singularly Perturbed Differential Equations".

Indian Institute of Technology Patna — *Patna, India*

Global Initiative of Academic Networks Course on Multi-Objective Optimization-2016 — *2016*

- Under the guidance of Dr. Carlos Artemio Coello Coello from CINVESTAV-IPN, Mexico.

National Institute of Science Education and Research — *Bhubaneswar, India*

Training Program in Mathematics - 2015 — *2015*

Dibrugarh University — *Dibrugarh, Assam, India*

Mathematics Training and Talent Search Program (MTTS) - 2015 — *2015*

Honors & Awards

DST INSPIRE Fellowship (2021-2025), Department of Science and Technology, Govt. of India.

Scholarship for Higher Education (SHE) (2013-2018), INSPIRE, Department of Science and Technology, Govt. of India.

Runner-Up Prize in Eastern India Science Fair (EISF) 2012 Quiz, Birla Industrial and Technological Museum, Kolkata, 2012.

Secured First place in State level Science Exhibition 2012 Quiz competition, Agartala, 2012.

Technical Skills

- **Mathematical Modelling:** LINGO, MATLAB, PYTHON, PYOMO, PYMOO.
- **Operational Research:** LINGO, MATLAB, PYTHON, PYOMO, PYMOO.
- **Disaster Response Logistics:** Mathematical Modelling, Operation Research, Optimization Algorithms.
- **Artificial Intelligence:** PYTHON.
- **Machine Learning:** PYTHON.

International Collaboration

My research journey has been significantly enriched by collaborative efforts with distinguished scholars from various international institutions, fostering a diverse exchange of ideas and methodologies. These collaborations have enhanced my research capabilities and broadened my perspective on global challenges in supply chain management and optimization.

- **Prof. Mostafa Hajiaghaei-Keshteli**
  Tecnológico de Monterrey, School of Engineering and Science, Mexico. Email: mostafahaji@tec.mx
  Prof. Hajiaghaei-Keshteli and I have worked together on AI-based relief demand forecasting, integrating advanced algorithms to improve predictive accuracy in humanitarian contexts.
- **Prof. Erfan Babaee Tirkolaee**
  Department of Industrial Engineering, Istinye Universitesi, Turkey. Email: erfan.babaee@istinye.edu.tr
  Our collaboration focuses on developing innovative mathematical models for logistical optimization, particularly in humanitarian operations, effectively combining our strengths in operations research and supply chain management.
- **Prof. Seyedali Mirjalili**
  Center for Artificial Intelligence Research and Optimization, Torrens University, Australia.
  Email: ali.mirjalili@gmail.com
  Working with Prof. Mirjalili has allowed me to explore advanced metaheuristic optimization algorithms and their applications, thereby enhancing the optimization techniques utilized in my research.
- **Prof. Laith Abualigah**
  Computer Science Department, Al al-Bayt University, Mafraq 25113, Jordan. Email: aligah.2020@gmail.com
  My collaboration with Prof. Abualigah has involved applying optimization algorithms to real-world problems, with a focus on enhancing decision-making processes in various contexts.
- **Prof. Absalom El-Shamir Ezugwu**
  Unit for Data Science and Computing, North-West University, Potchefstroom 2520, South Africa. Email: Absalom.Ezugwu@nwu.ac.za
  Together with Prof. Ezugwu, I have engaged in research that integrates optimization algorithms and data science methodologies with operational research, contributing to more effective solutions in complex scenarios.
- **Prof. Vladimir Simic**
  Transport and Traffic Engineering Department, University of Belgrade, Serbia. Email: vsima@sf.bg.ac.rs
  Prof. Simic and I have collaborated on projects related to artificial intelligence and decision-making techniques, aiming to improve efficiency in transportation logistics.
- **Prof. Dragon Pamucar**
  Department of Operational Research and Statistics, University of Belgrade, Serbia.
  Email: dpamucar@gmail.com
  Our joint research efforts focus on optimization techniques, contributing to the development of resource allocation models that enhance operational efficiency.
- **Prof. Heming Jia**
  College of Information Engineering, Sanming University, Sanming, China. Email: jiaheming@fjsmu.edu.cn
  Collaborating with Prof. Jia has provided valuable insights into the application of optimization algorithms, particularly in information engineering contexts.

- **Dr. Fariba Goodarzian**
  Edinburgh Business School, Heriot-Watt University, Edinburgh, UK. Email: F.Goodarzian@hw.ac.uk
  My collaboration with Dr. Goodarzian has centred on interdisciplinary approaches to supply chain resilience, integrating perspectives on disaster response and management.
- **Nima Khodadadi**
  University of Miami, Miami, Florida, United States. Email: nima.khodadadi@miami.edu
  Working with Nima Khodadadi has allowed me to explore innovative ideas in metaheuristics, emphasizing the importance of collaboration in addressing complex engineering challenges.

These international collaborations have not only enriched my research portfolio but have also fostered a global network of scholars dedicated to advancing knowledge and practice in supply chain management and optimization.

Journal Publications

1. **Biswas, S.**, Kumar, D., Nas, M., Softa, M., Akgün, E., & Bera, U. K. (2024). **Performance of a Five-Layer ANN Model for Earthquake Magnitude Prediction and Spatial Risk Mapping in Turkey.** Decision Making Advances, 3(1), 40–49.
   - **Published**: 9th September 2024, **Decision Making Advances**
   - **DOI:** `https://doi.org/10.31181/dma31202553`
2. **Biswas, S.**, Belamkar, P., Sarma, D., Tirkolaee, E. B., & Bera, U. K. (2024). **A multi-objective optimization approach for resource allocation and transportation planning in institutional quarantine centres.** Annals of Operations Research, 1-45.
   - **Published**: 9th July 2024, **Annals of Operations Research (Q1)**
   - **DOI:** `https://doi.org/10.1007/s10479-024-06072-8`
3. **Biswas, S.**, Shaikh, A., Ezugwu, A. E. S., Greeff, J., Mirjalili, S., Bera, U. K., & Abualigah, L. (2024). **Enhanced prairie dog optimization with Levy flight and dynamic opposition-based learning for global optimization and engineering design problems.** Neural Computing and Applications, 1-34.
   - **Published**: 30th March 2024, **Neural Computing and Applications (Q1)**
   - **DOI:** `https://doi.org/10.1007/s00521-024-09648-4`
4. **Biswas, S.**, Kumar, D., Hajiaghaei-Keshteli, M., & Bera, U. K. (2024). **An AI-based framework for earthquake relief demand forecasting: A case study in Türkiye.** International Journal of Disaster Risk Reduction, 102, 104287.
   - **Published**: 20th January 2024, **International Journal of Disaster Risk Reduction (Q1)**
   - **DOI:** `https://doi.org/10.1016/j.ijdrr.2024.104287`
5. Belamkar, P., **Biswas, S.**, Baidya, A., Majumder, P., & Bera, U. K. (2023). **Multi-objective optimization of agro-food supply chain networking problem integrating economic viability and environmental sustainability through type-2 fuzzy-based decision making.** Journal of Cleaner Production, 421, 138294.
   - **Published**: 4th August 2023, **Journal of Cleaner Production (Q1)**
   - **DOI:** `https://doi.org/10.1016/j.jclepro.2023.138294`
6. **Biswas, S.**, Belamkar, P., & Bera, U. K. (2023)(in press). **A redistribution-based multi-stage humanitarian logistic design model considering the spherical fuzzy methodology.** International Journal of Logistics Systems and Management, 1(1).
   - **Accepted**: 3rd August 2023, **International Journal of Logistics Systems and Management**
   - **DOI:** `https://doi.org/10.1504/IJLSM.2023.10060514`
7. **Biswas, S.**, KUMAR, D., & Bera, U. K. (2023). **Prediction of earthquake magnitude and seismic vulnerability mapping using artificial intelligence techniques: A case study of Turkey.**

- Preprint: DOI: https://doi.org/10.21203/rs.3.rs-2863887/v1

Conference Publications

1. **EVALUATION OF ARTIFICIAL NEURAL NETWORKS IN PREDICTING EARTHQUAKE MAGNITUDES AND ASSESSING RISKS IN TÜRKIYE**
   - Published in Conference: 2nd International Graduate Studies Symposium on Geoscience, DEU INTERNATIONAL SYMPOSIUM SERIES ON GRADUATE RESEARCHES-2023, At: Dokuz Eylül University, Izmir, Turkey.
2. **A Spherical Fuzzy-MARCOS-based Decision-Making Model for Optimizing UAV Landing Zone Selection and Payload Delivery**
   - Accepted and Presented in ICONIEA 24, Department of Industrial and Systems Engineering, Indian Institute of Technology Kharagpur, Springer Book Chapter.
3. **Testing of Advanced Machine Learning for Flood Forecasting: A Case Study of the Gumti Basin in Tripura, India**
   - Accepted and Presented in Roorkee Water Conclave (RWC) 2024, IIT Roorkee and NIH Roorkee, Mar 03 - 06, 2024.
4. Mishra, K., **Biswas, S.**, & Bera, U. K. (2022, April). **Solution of Stochastic Transportation Problem Involving Multi-choice Constraints of Exponential Distribution using Lagrange's Interpolation.** In 2022 IEEE 7th International conference for Convergence in Technology (I2CT) (pp. 1-6). IEEE.
   - DOI: https://doi.org/10.1109/i2ct54291.2022.9825146
5. Ankur, S., Majumder, P., Bera, U. K., & **Biswas, S.** (2022, July). **A co-operative game theoretical strategy of Vendor and Buyer in an EPQ model of deteriorating items under trade credit policy.** In 2022 IEEE Region 10 Symposium (TENSYMP) (pp. 1-6). IEEE.
   - DOI: https://doi.org/10.1109/tensymp54529.2022.9864527

Book Chapter Publication

1. **A Spherical Fuzzy-MARCOS-based Decision-Making Model for Optimizing UAV Landing Zone Selection and Payload Delivery**
   - Accepted and Presented in ICONIEA 24, Department of Industrial and Systems Engineering, Indian Institute of Technology Kharagpur, Springer Book Chapter.

Reviewer Role

As a reviewer, I actively contribute to the scholarly community by evaluating manuscripts for several prestigious journals. My review activities include reviewing for the **Annals of Operations Research (IF=4.4)**, **Engineering Applications of Artificial Intelligence (IF=7.5)**, and the **Journal of Cleaner Production (IF=9.7)**. I have also provided feedback for the **Journal of Environmental Management (IF=)**, **Journal of Intelligent Manufacturing (IF=5.9)**, **Neural Computing & Applications (IF= 4.5)**, and **Swarm and Evolutionary Computation (IF=8.2)**. Additionally, I have reviewed manuscripts for **Risk Management and Healthcare Policy (IF=2.7)** and **PLOS ONE (IF=2.9)**. These roles enable me to contribute to maintaining the quality and rigour of research in my areas of expertise, including operations research, supply chain management, artificial intelligence, and disaster management.

Teaching and Pedagogical Experiences

As a dedicated and passionate educator at the National Institute of Technology Agartala, India, I have enhanced the educational experience for students enrolled in various Engineering Mathematics courses. Below are the details of the courses I have taught: 1. M-101: Engineering Mathematics-I (Autumn Semester) (Topics: Functions of Several Variables, Laplace Transform); 2. M-201: Engineering Mathematics-II (Spring Semester) (Topics: Integral Calculus, Vectors); 3. M-301: Engineering Mathematics-III (Autumn Semester) (Topics: Probability and Statistics); 4. M-401: Engineering Mathematics-IV (Spring Semester) (Topics: Operations Research, Numerical Analysis).

Professional Membership

- IEEE: Kolkata Section, R10 -Asia and Pacific, India.
- Soft Computing Research Society, New Delhi, India.
- Tripura Mathematical Society, Agartala, India.