

ABIRA SENGUPTA

★ Simulator & Data Scientist

- 🎓 Doctor of Philosophy (PhD) in Information Science (University of Otago)
- 🎓 Master of Technology (M.Tech) in Computer Science (WBUT, India)
- 🎓 Bachelor of Technology (B.Tech) in Computer Science (WBUT, India)

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🎓 Google Scholar

📍 NEW ZEALAND



🧠 RESEARCH EXPERIENCE

☑ Doctor of Philosophy (PhD) - Multi-agent system

Department of Information Science, University of Otago
- Marsden grant

📍 Dunedin, New Zealand

- 🌿 Implement Expectation Event Calculus (EEC) and the Collective Action Simulation Platform (CASP) top of the Repast Symphony to build a generic computational model.
- 🌿 My research focuses on the use of logical reasoning regarding expectations and generalised representation to help computational agents to solve a range of collective action problems.
- 🌿 This approach allows agents to continuously learn boldness and vengefulness parameters across multiple scenarios with different applications of expectation-related reasoning, such as expectation, team reasoning norms, and metanorm.

☑ Post-PhD Collaboration

University of Otago - State University of New York at Buffalo, USA

📅 Oct 2024 - continue

- 🌿 Implement, apply Explainable AI and Multimodal system to predict methane emissions using Google Earth Engine and Copernicus Data sets.
- 🌿 My research focuses on predicting methane emissions from rice paddies and post-wildfire environments. This work has broad implications for understanding natural methane emissions from wet ecosystems, which play an important role in global warming dynamics.

☑ Affiliated Researcher

Indian Statistical Institute

📅 March 2024 - continue 📍 India

- 🌿 Implement, apply Explainable AI (XAI) to obtain the most important features which affect the performance of climate prediction models, such as those related to wildfire behavior and spread, cloud bursting, and precipitation.
- 🌿 This study highlights the relevance of hyperparameter adjustment in enhancing model accuracy and finding significant features using XAI, which is very useful in environmental monitoring applications.

🎓 EDUCATION

🎓 Doctor of Philosophy (PhD) - Information Science University of Otago, New Zealand.

📅 2019 - finished defense

Thesis title: A generic approach to reasoning about collective action problems using expectations

🎓 Master of Technology (M.Tech) - Computer Science West Bengal University of Technology, India.

📅 Jul 2011 - June 2013

Thesis title: Localised algorithm for coverage in wireless sensor network

GPA: 8.87/10

🎓 Bachelor of Technology (B.Tech) - Computer Science West Bengal University of Technology, India.

📅 Jul 2006 - June 2010

GPA: 7.43/10

📖 PUBLICATIONS

👥 Conferences

Modelling methane emissions from rice paddies using machine learning

👥 Image and Vision Computing New Zealand (IVCNZ) [🔗](#)

📅 2024

Software as a Medical Device: Design and Compliance

👥 International Conference on Computer and Automation Engineering (ICCAE)

📅 2025 - Accepted

Using Pangenome Graphs to Improve Variant Detection in Bacteria

👥 IEEE Women in Bioinformatics Workshop (WIBI)

📅 2025 - Submitted

Big Data Blueprint Architecture for Large Organizations

👥 Industrial Conference on Data Mining (ICDM)

📅 2025 - Submitted

🌿 Explore the integration of XAI and Causal AI techniques to ensure fairness and transparency in AI-driven climate models, promoting equitable and ethical applications in environmental decision-making.

✔ Collaborative Research

University of Otago

📅 June 2024 – continue 📍 Dunedin, New Zealand

- 🌿 Recent Advances in Explainable Machine Learning to identify the most important features that influence the performance of wildfire prediction models.
- 🌿 Collaborate on cross-functional projects to identify the conditions that increase the likelihood of forest fire ignition and predict the extent of the area burned once a fire starts. [↗](#)

✔ Postdoctoral research assistant

University of Otago - CRG Round 2 grant

📅 Nov 2023 – Feb 2024 📍 Dunedin, New Zealand

- 🌿 Machine learning is employed to identify the most significant characteristics, such as location, employment, age, and ethnicity. These findings are crucial for predicting telehealth adoption zones in New Zealand.
- 🌿 This study aims to assist telehealth service providers in enhancing their offerings and fostering better community engagement, ultimately driving increased adoption of telehealth systems.

✔ Research Assistant

University of Otago - Computer Science

📅 Aug 2021 – Dec 2021 📍 Dunedin, New Zealand

- 🌿 This involved analysis of text data to identify and classify emotional content. Analysed large datasets to provide insights into emotional trends and patterns within textual data.

✔ Pre-doctoral Research

Univ. of Technology, Sydney & Indian Statistical Institute

📅 2017– 2018 📍 Sydney, India (collaboration)

- 🌿 Machine Learning applied to facial image and pin-code detection.
- 🌿 Convolutional neural networks (CNN) were used to detect the pin-code in both structural and unstructured postal documents, as well as to authenticate facial images. CNN has been found to be effective at identifying individuals from degraded face images.

Predicting the Impact of Post-Wildfire Effects on Methane Uptake in Canada Using Machine Learning

👥 [International Conference on Machine Learning \(ICML\)](#)

📅 2025 - Submitted

Interpretable and explainable AI model for precipitation prediction

👥 [International Joint Conference on Neural Networks \(IJCNN\)](#)

📅 2025 - Submitted

Predicting Post-Wildfire Impacts on Greenhouse Gas Emissions Using Machine Learning

👥 [International Joint Conference on Neural Networks \(IJCNN\)](#)

📅 2025 - Submitted

A Review on Smart Weather Prediction using Machine Learning Approaches

👥 [International Conference on Web 6.0 and Industry 6.0](#)

📅 2025 - Submitted

Generalising Axelrod's Metanorms Game through the use of explicit domain-specific norms

👥 [International Workshop on Coordination, Organizations, Institutions, Norms and Ethics for Governance of Multi-Agent Systems \(COINE@AAMAS\)](#)

📅 2023

A Comparison of One-class versus Two-class Machine Learning Models for Wildfire Prediction in California

👥 [The 21st Australian Data Science and Machine Learning Conference \(AUSDM'23\)](#)

📅 2023

Solving social dilemmas by reasoning about expectations

👥 [International Workshop on Coordination, Organizations, Institutions, Norms and Ethics for Governance of Multi-Agent Systems \(COINE@AAMAS\)](#)

📅 2021




A Preliminary Investigation of LEACH, TEEN and DEEC Towards Wireless Sensing Application

👥 [International Conference on Computational Intelligence and Communication Technologies \(ICCICT\)](#) [↗](#)

📅 2021












RESEARCH SUPERVISION



-  **Research Mentor, PhD Studies (Ongoing) Indian Statistical Institute and Calcutta University:** Assisting two PhD students in their research focused on enhancing climate prediction models through the application of advanced machine learning techniques. Providing guidance on model design, data analysis, and algorithm optimization to improve the accuracy and reliability of climate forecasting systems.
-  **Co-Supervisor, Master's Thesis (2020 – 2021), Kalyani Government Engineering College:** Guided a Master student of Information Science student on a research project focused on road obstacle detection using convolutional neural networks (CNN). The project employed the YOLO algorithm to classify and localize various objects encountered by a car, enhancing object recognition and safety in autonomous driving systems.
-  **Research Project Supervisor, Bachelor's Projects (2017 – 2018) Narula Institute of Technology:** Supervised research projects for four Computer Science undergraduate students, providing mentorship on project design, implementation, and documentation, fostering their development of technical and analytical skills.



TEACHING EXPERIENCE

-  Tutor/Demonstrator
University of Otago - School of Computing
 Aug 2019 – Continue  Dunedin, New Zealand
-  **Digital Health (DIGH 708 & 709):** Led discussions on digital health innovations that enhance well-being and promote self-management (2023).
-  **Data Science using R (COMP 120):** Taught data manipulation, visualization, and analysis using R (2024, 2023, 2022, 2021). Checked more than 60 students' assignments.
-  **Machine Learning with Python (INFO 204):** Guided students in applying Python coding to develop machine learning models (2024, 2023, 2022, 2021, 2020) and checking their practical test and assignments.
-  **Software Development (INFO 301):** Provided hands-on instruction in advanced software development techniques (2022). Evaluated students' presentations and their projects and related reports.
-  **System Development with JAVA (INFO 310):** Supported coursework in software and systems development using Java (2021). Evaluated students' presentations.
-  **Database management systems and SQL Coding (COMP 101):** Delivered foundational training in SQL and Java for beginners (2019 & 2024).

More Realistic and Efficient Face-Based Mobile Authentication using CNNs

 [International Joint Conference on Neural Networks \(IJCNN\)](#) 

 2018

Linking face images captured from the optical phenomenon in the wild for forensic science

 [International Joint Conference on Biometrics \(IJCB\)](#) 

 2017

Pincode detection using deep CNN for postal automation


 [Image and Vision Computing New Zealand \(IVCNZ\)](#) 

 2017

Journals


Teaching and Learning Experience with the Kahoot feedback system

 [Asia-Pacific Journal of Teacher Education](#)

 2024 - Submitted


Recent Advances in Explainable Machine Learning Models for Wildfire Prediction

 [Applied Computing and Geosciences](#)

 2024 - Submitted

Modeling Methane Emissions from Rice Paddies with Explainable AI

 [Nature Computational Science](#)

 2024 - Submitted

Posters

Modelling methane emissions from rice paddies using machine learning

 [Image and Vision Computing New Zealand \(IVCNZ\)](#)

 2024

Generalising Axelrod's metanorm game with the expectation event calculus

 [Student Research Symposium of Otago](#) 

 2022

Normative Reasoning Based On Emotions In Multi-Agent System To Solve Social Dilemmas

 [Artificial Intelligence Researchers Association \(AIRA\), NZ](#)

✓ Lecturer

Jadavpur University

📅 Aug 2016 – June 2017 📍 India

📖 Delivered lectures and practical demonstrations on multimedia systems to a class of over 50 students. Facilitated hands-on learning experiences, covering topics such as multimedia processing, content creation, and system design.

Narula Institute of Technology

📅 Aug 2013 – Dec 2018 📍 India

📖 Taught core subjects including C, Multimedia, and Networking theory to over 55 students. Evaluated student assignments, designed internal examination questions, and graded exam papers to assess performance. Participated in oral examinations for final-year BTech students, assessing their final-year project presentations and providing constructive feedback.

Kalyani Government Engineering College

📅 Aug 2014 – Dec 2018 📍 India

📖 Taught core subjects including Algorithms, Automata, Graphics, and Multimedia to over 50 students. Evaluated student assignments, designed internal examination questions, and graded exam papers to assess performance. Participated in oral examinations for final-year BTech students, assessing their final-year project presentations and providing constructive feedback.

👥 REFEREES

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🗣️ LANGUAGES

English ●●●●●

Bengali ●●●●●

Hindi ●●●●●

Sanskrit ●●●●●

📅 2020

📁 PROFESSIONAL PORTFOLIO

🏆 RESEARCH FUNDING/ACHIVEMENTS

- 📌 57250 NZD: Marsden scholarship (3 years PhD studies).
- 📌 2964 NZD: Pūtea Tautoko Fund.
- 📌 2800 NZD: Departmental award.
- 📌 3500 NZD: Technical Education Quality Improvement Programme (MTech scholarship)

👤 MEMBERSHIP

- 📌 Member of the Centre for Artificial Intelligence and Public Policy (CAIPP), NZ.
- 📌 Member of the Artificial Intelligence Researchers Association (AIRA), NZ.
- 📌 Student membership of IEEE.
- 📌 Member of Software Innovation NZ (SINZ).

💬 PEER REVIEWER

- 📌 Peer Reviewer for SMC 2023 Conference

📅 WORKSHOP ORGANIZING COMMITTEE

- 📌 School of Computing Postgraduate Symposium 2023, University of Otago.
- 📌 HRC Telehealth 2023, University of Otago.

🏠 GRANTS

- 📌 Commerce Research Grant Round 2-2023.

📁 PROFESSIONAL POSITION

- 📌 Affiliated researcher (2024 - continue).
- 📌 Visiting Scientist at Indian Statistical Institute (Mar, April, 2024).
- 📌 Postdoctoral research assistant at the University of Otago (Nov, 2023 to Feb, 2024).

⚙️ SKILLS & STRENGTHS

Lecturing/ Demonstrating Computational Modeler

AI & Big Data Analytic Data Scientist

Explainable-AI Multimodal system R Python

Expectation Event Calculus Prolog JAVA C