Debabrota Basu

Address Chalmers University of Technology
Dept. of Computer Science and Engineering
Göteborg, Sweden-41296.

Website https://debabrota-basu.github.io/
Email basud@chalmers.se

Fields of Interest

Statistical learning theory, Reinforcement learning, Multi-armed bandits, Adversarial learning, Differential privacy, Fairness and algorithmic bias, Information Theory, Topological data analysis.

Education

2014-2018 PhD in Computer Science - School of Computing, National University of Singapore

Thesis- *Learning to Make Decisions with Incomplete Information: Reinforcement Learning, Information Geometry, and Real-Life Applications*
Advisors- Prof. Stephane Bressan and Prof. Pierre Senellart
Examiners- Olivier Cappe, Jonathan Scarlett, and Tan Kian Lee

2010-2014 B.E. in E.T.C.E. - Electronics and Telecommunication Engineering, Jadavpur University

Thesis- *Non-rigid Image Registration using Embedded Distance based Graph Cut Algorithm*
Advisor- Prof. Ananda Shankar Chowdhury

Research Experience

Mar 2019-Present **Postdoctoral research fellow**
PI: Christos Dimitrakakis and Devdatt Dubhashi.
Data Science and AI Division, Chalmers University of Technology, Sweden.

June 2019-July 2019 **Visiting researcher: Fairness in Reinforcement Learning**
PI: David Parkes.
School of Engineering and Applied Sciences, Harvard University, USA.

Aug 2018-Feb 2019 **Research fellow**
PI: Stephane Bressan, Assoc. Prof.
School of Computing, National University of Singapore, Singapore.

April 2017-July 2017 **Visiting graduate student**
Advisor: Pierre Senellart, Prof., Computer Science Department.
DI, École Normale Supérieure, Paris, France.

May 2016-July 2016 **Visiting researcher: A Learning approach to Efficient Migration of Virtual Machines in Clouds**
Advisor: Haibo Chen, Prof., Institute of Parallel and Distituted Systems.
Shanghai Jiao Tong University, Shanghai, China.

Jan 2015-Oct 2018 **Graduate researcher**
Advisor: Stephane Bressan (NUS) and Pierre Senellart (ENS).
Image and Pervasive Access Laboratory (IPAL), UMI CNRS, Singapore.

Aug 2015-Mar 2018 **Graduate researcher**
Advisor: Stephane Bressan, Assoc. Prof., NUS.
Energy and Environmental Sustainability Solutions for Megacities - E2S2, NUS, Singapore and SJTU, Shanghai.

May 2014-July 2014 **Research intern: Design of Quantum True Random Number Generator**
Advisor: Subhamoy Maitra, Prof., Applied Statistics Unit.
Centre for excellence in cryptology, Indian Statistical Institute, Kolkata.

May 2013 - July 2013 **Research intern: Fuzzy Job Shop Scheduling and Manpower Scheduling Algorithms**
Advisor: P.N. Suganthan, Assoc. Prof, School of Electrical Engineering.
Computer Vision Laboratory, Nanyang Tachnological University, Singapore.

May 2012 - July 2012 **Research intern: Design of advanced control and automation system for industrial plants**
Control and Process Automation group, ABB.
ABB, Bengaluru, India.

Selected Academic Publications

[BDB20] Debabrota Basu, Devdatt Dubhashi, and Chiranjib Bhattacharyya. "For and By Randomness: A Probabilistic Approach to Certification and Adversarial Defense". In: *Under Revision* (2020).

[Bas+20] Debabrota Basu et al. "Set Fairness". In: *Under Revision* (2020).

[DBB20] Ashish Dandekar, Debabrota Basu, and Stéphane Bressan. "Differential Privacy at Risk: Bridging Randomness and Privacy Budget". In: *AAAI Workshop on Privacy-Preserving Artificial Intelligence*. 2020.

[Dim+20] Christos Dimitrakakis et al. "Inferential Induction: Joint Bayesian Estimation of MDPs and Value Functions". In: *Under Revision* (2020).

[GBD20] Divya Grover, Debabrota Basu, and Christos Dimitrakakis. "Bayesian Reinforcement Learning via Deep, Sparse Sampling". In: *AISTATS*. 2020.

[ABB19a] Naheed Anjum Arafat, Debabrota Basu, and Stéphane Bressan. "ϵ-net Induced Lazy Witness Complex on Graphs". In: *International Workshop on Applications of Topological Data Analysis*. ECML-PKDD, 2019.

[ABB19b] Naheed Anjum Arafat, Debabrota Basu, and Stéphane Bressan. "Topological Data Analysis with ϵ-net Induced Lazy Witness Complex". In: *DEXA (2)*. Vol. 11707. Lecture Notes in Computer Science. Springer, 2019, pp. 376–392.

[BDT19] Debabrota Basu, Christos Dimitrakakis, and Aristide C. Y. Tossou. "Differential Privacy for Multi-armed Bandits: What Is It and What Is Its Cost?" In: *CoRR* abs/1905.12298 (2019).

[BSB19] Debabrota Basu, Pierre Senellart, and Stéphane Bressan. "BelMan: Information Geometric Approach to Stcohastic Bandits". In: *ECML-PKDD*. 2019.

[Bas+19] Debabrota Basu et al. "Learn-as-you-go with Megh: Efficient Live Migration of Virtual Machines". In: *IEEE Trans. Parallel Distrib. Syst.* 30.8 (2019), pp. 1786–1801.

[DBB19] Ashish Dandekar, Debabrota Basu, and Stéphane Bressan. "Differentially Private Non-parametric Machine Learning as a Service". In: *DEXA (1)*. Vol. 11706. Lecture Notes in Computer Science. Springer, 2019, pp. 189–204.

[Dan+19] Ashish Dandekar et al. "Privacy as a Service: Publishing Data and Models". In: *DASFAA (3)*. Vol. 11448. Lecture Notes in Computer Science. Springer, 2019, pp. 557–561.

[TBD19] Aristide C. Y. Tossou, Debabrota Basu, and Christos Dimitrakakis. "Near-optimal Optimistic Reinforcement Learning using Empirical Bernstein Inequalities". In: *ICML Workshop on Exploration in RL*. 2019.

[DBB18] Ashish Dandekar, Debabrota Basu, and Stéphane Bressan. "Differential Privacy for Regularised Linear Regression". In: *DEXA (2)*. Vol. 11030. Lecture Notes in Computer Science. Springer, 2018, pp. 483–491.

[Bas+17] Debabrota Basu et al. "Learn-as-You-Go with Megh: Efficient Live Migration of Virtual Machines". In: *ICDCS*. IEEE Computer Society, 2017, pp. 2608–2609.

[Liu+17] Qing Liu et al. "How to Find the Best Rated Items on a Likert Scale and How Many Ratings Are Enough". In: *DEXA (2)*. Vol. 10439. Lecture Notes in Computer Science. Springer, 2017, pp. 351–359.

[Bas+16] Debabrota Basu et al. "Regularized Cost-Model Oblivious Database Tuning with Reinforcement Learning". In: *T. Large-Scale Data- and Knowledge-Centered Systems* 28 (2016), pp. 96–132.

[Bas+15] Debabrota Basu et al. "Cost-Model Oblivious Database Tuning with Reinforcement Learning". In: *DEXA (1)*. Vol. 9261. Lecture Notes in Computer Science. Springer, 2015, pp. 253–268.

[Bha+15] Saugat Bhattacharyya et al. “Interval type-2 fuzzy logic based multiclass ANFIS algorithm for real-time EEG based movement control of a robot arm”. In: *Robotics and Autonomous Systems* 68 (2015), pp. 104–115.

[Das+14] Swagatam Das et al. “A Spatially Informative Optic Flow Model of Bee Colony With Saccadic Flight Strategy for Global Optimization”. In: *IEEE Trans. Cybernetics* 44.10 (2014), pp. 1884–1897.

Awards and Honours

2019-2020 **Graduate Research Innovation Programme (GRIP)**
National University of Singapore.

2017-2018 **I&E Practicum@SoC Award**
School of Computing and NUS Enterprise, National University of Singapore.

2014-2018 **NUS Research Scholarship**
National University of Singapore for graduate studies.

2010 - 2014 **ABB JDF Scholarship (International)**
ABB Jurgen Dorman Foundation.

2010 **KVPY Fellowship**
Dept. of Science and Technology, Govt. of India and Indian Institute of Sciences.

2010 - 2014 **National Merit Scholarship**
Ministry of Human Resource and Development, India.

2010 - 2014 **Indian Oil Academic Scholarship.**
Indian Oil Corporation Limited.

2010 - 2014 **West Bengal Government Merit-cum-Means Scholarship.**
Government of West Bengal, India.

Selected Talks and Presentations

Sept 2019 **Near-optimal Optimistic Reinforcement Learning using Empirical Bernstein Inequalities**
Multi Armed Bandit Workshop, Imperial College London, UK.

Mar 2019 **Price of Incomplete Information: Bridging Multi-armed Bandits and Information Theory**
Chalmers Machine Learning Seminar, Göteborg, Sweden.

Mar 2018 **Learning to Take Decisions with Incomplete Information**
IBM Research, Singapore.

Dec 2017 **Learning to Optimise Marine Vessel Speed under Dynamic Weather Conditions**
Centre for Maritime Studies, National University of Singapore, Singapore.

Feb 2016 **Reinforcement Learning for Virtual Machines Migration.**
NUS-HUST-NICT Workshop, School of Computing, National University of Singapore, Singapore.

Nov 2015 **Automatic Live Migration of Virtual Machines in Clouds**
CREATE Energy and Environmental Sustainability Solutions for Megacities Meeting, China.

Aug 2012 **Energy and Economics: Present and Future.**
ABB-JDF Engineering Education Event, ABB Research Centre, Baden-Dättwil, Switzerland.

Pedagogical Courses

Aug 2019-Dec 2019 **CIU950: University Teaching and Learning**
Chalmers University of Technology, Sweden

Feb 2019-March 2019 **CIU965: Diversity and Inclusion for Learning in Higher Education**
Chalmers University of Technology, Sweden

Teaching Experience

Jan 2020- April 2020 **FDAT070: Reinforcement Learning and Decision Making Under Uncertainty**
Course Instructor
Department of CSE, Chalmers University of Technology.

Aug 2017- Dec 2017 **CS6234: Advanced Algorithms**
Teaching Assistant
Department of Computer Science, School of Computing, NUS.

Jan 2017- May 2017 **CS3230: Design and Analysis of Algorithms**
Teaching Assistant
Department of Computer Science, School of Computing, NUS.

Jan 2017- May 2017 **CS1010E: Programming Methodology**
Teaching Assistant
Department of Computer Science, School of Computing, NUS.

Aug 2016- Dec 2016 **CS1231: Discrete Mathematics**
Teaching Assistant
Department of Computer Science, School of Computing, NUS.

Aug 2015- Dec 2015 **CS3230: Design and Analysis of Algorithms**
Teaching Assistant
Department of Computer Science, School of Computing, NUS.

Jan 2015 - May 2015 **CS1020E: Data Structures and Algorithms I**
Teaching Assistant
Department of Computer Science, School of Computing, NUS.

Jan 2015 - May 2015 **DSC5211C: Quantitative risk management.**
Teaching Assistant
Department of Decision Sciences, NUS Business School.

Student Supervision

MSc. Thesis 2020 **Igor Ryazanov, Chalmers University of Technology**
Topic: Deep Learning for Deep Water

MSc. Thesis 2020 **Sushma Tungal and Pragya Singh, Chalmers University of Technology**
Topic: Preconditioning of Batteries using Machine Learning

Public Outreach

Public Writing **Ethics in the Time of AI (in Bengali)**
Coming soon in Ananda Bazar Patrika, 2020.

Data Privacy and AI: A Bitter-sweet Marriage (in Bengali)
Coming soon in Bigyan e-Magazine, 2020.

Paradigm Shifts in Science and Social Revolutions (in Bengali)
Published in International Book Fair, Kolkata, 2014

Public Lectures **The Learning Machines: Reality, Future and Responsibility**
Science and Technology Stage, Campus Party, Singapore Expo, July 2018.

Building Bridges Through Poetry
College of Alice & Peter Tan Student Symposium, Aug, 2018.

Peer-review Experience (Selected)

Conferences: ICML 2020, AISTATS 2020, AAAI 2020, DEXA 2018.
Journals: IEEE Transactions on Parallel and Distributed Systems (TPDS), IEEE Transactions on Automatic Control (TAC), IEEE Access, IEEE Transactions on Information Forensics & Security (TIFS), Automatika, Neurocomputing.

Business/Managerial Experience

Apr 2018-Jan 2019 **Chief Data Science Lead**
OPINIR, Singapore.

Jan 2018-Apr 2018 **Enterpreneurial Lead for OPINIR**
Lean Launch Pad Program by NUS Enterprise, Singapore.

Dec 2017-Dec 2018 **Project Lead for InDivision**
Supported by Innovation & Enterpreneurship Practicum at SoC award, 2017-2018, and mentored by Francis Yeoh, ex-head of National Research Foundation (NRF), Singapore.

2017 **Consulting**
AI-Robotics, An autonomous driving start-up in Singapore.

Research Grants and Funds

Jan 2019-Jan 2020 **Graduate Research Innovation Programme (GRIP), NUS**
Co-applicant

Sept 2019-Dec 2019 **Deep Learning for Deep Water, Chalmers University of Technology (AoA Transport, 2019)**
Co-applicant

Jan 2019-Dec 2021 **Adversarial Machine Learning in Big Data Era, WASP-NTU Grant**
Employee

Aug 2019-Mar 2021 **Janus: Effective, Efficient and Fair Algorithms for Spatio-temporal Crowdsourcing, NUS**
Employee

Beyond 'Academic' Publications

Poetry **Migrant Tales: An anthology of poems by migrant Bengali poets in Singapore.**
Poet and translator (Bangladesh and Singapore, 2017).

Stranger to Myself by MD Sharif Uddin (Singapore Book Awards, Non-fiction, 2018).
Translator (Singapore, 2018).

Theatre **Zebra Crossing (Showcased at Esplanade Theatre, Singapore)**
Director, actor and script writer (Singapore 2018, 2019).

Cinema **A Land Imagined (Golden Leopard Award 2019)**
Actor and translator (Singapore, 2019).(Link)

Philosophy **The Case Against Classification: A Phenomenological Analysis**
Working paper in Philosophy, 2018.