

# Arghya Bhattacharya

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## Summary

Fourth-year doctoral candidate with experience in both academic research and industry; experienced in designing cache-friendly algorithms that are good in both theory and practice, and machine-learning augmented algorithms for traditional online problems.

## Short Bio

- **Ph.D. Candidate**, Dept. of Computer Science, Stony Brook University
- **HS-WISE Mentor**, High School Women in Science and Engineering
- **JBNSTS Senior Scholar'12** Jagadis Bose National Science Talent Search
- **Administrative Member**, JB Scholars Professional Development Forum
- **Hackathon Enthusiast**, Winner of Hack@CEWIT'22, SBUHack'21, etc.

## Research Interest

External memory algorithm  
Parallel algorithm  
Machine learning  
Online algorithm  
Filesystem aging

## Technical Skills

C++	Python
Shell	Latex
MySQL	Matlab
Keras	PyTorch

## Work Experience

- **Nokia Bell Labs** Virtual Office, NY  
*Cloud and Networking Intern, Manager: T. V. Lakshman, Supervisor: Edward Grinshpun, Chuck Payette* Jun. 2022 – Aug. 2022
  - Designing algorithms for low-latency live video streaming.
- **Stony Brook University** Stony Brook, NY  
*Research Project Assistant, Advisor: Prof. Michael A. Bender* Jun. 2019 – Present
  - **Machine-learning augmentation:** Redesigned traditional online algorithms for rent-or-buy problems with augmentation by single and multiple machine learning oracles [Paper published in WALCOM'22]; the journal version deals with a more generalized version of the problem with an arbitrarily fluctuating discount. [Article submitted in TCS, Elsevier] Designed green paging and parallel paging algorithms with ML augmentation [Manuscript in preparation].
  - **Cache-efficient algorithms:** Designed an empirical framework to evaluate when  $(a, b, c)$ -regular cache-oblivious algorithms are cache-efficient as external memory algorithms and do not degrade in the face of memory fluctuations that are common in most modern systems. [Paper submitted in ESA'22] [code]
  - **Threading ecosystem:** Built a framework to evaluate the performance of external memory algorithms with multi-threading in a multi-program environment. [Manuscript in preparation] [code]
  - **Filesystem aging:** Evaluated microbenchmarks and application-level fragmentation benchmarks to measure slowdown in the random read performance for several production filesystems (**ext4**, **btrfs**, **xfs**, **zfs**, and **f2fs**) as well as a  $B^+$ -tree based write-optimized in-kernel filesystem **BetrFS**. [Article submitted in ACM TOCS] [code]
- **National University of Singapore** Singapore  
*Research Engineer, Advisor: Prof. Dipti Srinivasan* May. 2018 – Aug. 2018
  - Reviewed the performance of multi-objective optimization algorithms using evolutionary computation based on decomposition techniques.
- **Pricewaterhouse Coopers (PwC) India Pvt. Ltd.** Kolkata, India  
*Consultant, Manager: Sudipto Sarkar* Jul. 2016 – Sep. 2017
  - Built a payroll automation system using DotNet technologies using MVC architecture.
  - Implemented the Microsoft Navision enterprise resource planning software (ERP) for finance, procurement, and inventory management.
- **Jadavpur University** Kolkata, India  
*Undergraduate Research Intern, Advisor: Prof. Debangshu Dey* Jun. 2015 – May. 2016

- Designed algorithms for affective computing: a study of Bi-dimensional Empirical Mode Decomposition (BEMD) based feature extraction, Principle Component Analysis (PCA), Linear Discriminant Analysis (LDA) based dimensionality reduction, Gray-level Co-occurrence Matrix (GLCM), Histogram of Oriented Gradients (HOG), Local Ternary Pattern (LTP) based feature elimination, and Multi-class Support Vector Machine (SVM), k-Nearest Neighbor (k-NN) based classification in context of emotion recognition [Article published in Soft computing, Springer].
- Designed tools and algorithms for biomedical image processing and cancer detection using Optical Colonoscopy videos [Paper published in WiSPNET'16].

#### Indian Institute Technology, Kharagpur

Kharagpur, India

Undergraduate Summer Intern, Advisor: Prof. Jayanta Mukhopadhyay

Jun. 2014 – Aug. 2014

- Design of a Portable Electronic Device for Non-invasive continuous measurement of Blood Pressure by Bio-impedance measurement and Assessment of Cardiac Health in larger perspective.

## Education

#### Stony Brook University

New York, USA

Ph.D. Candidate, Dept. of Computer Science

Sep. 2018 – Dec. 2023 (expected)

- **Advisor:** Prof. Michael A. Bender, **Collaborator:** Rezaul A. Chowdhury
- Cumulative GPA 3.78 / 4.0
- **Graduate Courses:** Analysis of Algorithms, Computer Networks, Discrete Maths, Data Science, Introduction to Computer Vision, Theory of Database Systems, Medical Imaging.
- **Class Projects:**
  - \* Optimizing network congestion window using Ricci Curvature.
  - \* Semantic segmentation using U-Net and instance segmentation of nuclei using Mask R-CNN.
  - \* Identifying fundraising donors with Logistic Regression, Decision Tree, Random Forest and LightGBM.

#### Jadavpur University

Kolkata, India

B.E. in Electrical Engineering

Jul. 2012 – May. 2016

- Cumulative GPA: 7.74/10 Total marks: 72.69/100 with First Class
- Qualified GATE 2016 in Electrical Engineering Score: 45.66 GATE Score: 584/1000 Rank: 3278
- **Related Coursework:** Advanced Instrumentation-I, Advanced Instrumentation-II, Digital Signal Processing, Numerical Analysis and Computer Programming, Reliability Engineering, Signals and Systems, Circuit Theory, Control System Engineering

## Selected Publications & Posters

- **Arghya Bhattacharya**, Rathish Das, “Machine Learning Advised Ski Rental Problem with a Discount,” *16th International Conference and Workshops on Algorithms and Computation (WALCOM'22)*.
- **Arghya Bhattacharya**, Rathish Das, “Machine Learning Advised Algorithms for the Ski Rental Problem with a Discount”, under review in *Theoretical Computer Science, Elsevier*.
- Alex Conway, Ainesh Bakshi, **Arghya Bhattacharya**, Rory Bennett, Yijheng Jiao, Erik Knorr, Michael A. Bender, Willaim Jannen, Rob Johnson, Bradley C. Kuszmaul, Donald E. Porter, Yang Zhan, and Martin Farach-Colton, “File System Aging,” under review in *ACM Transactions on Computer Systems (TOCS)*.
- **Arghya Bhattacharya**, Helen Xu, Abiyaz Chowdhury, Rezaul A. Chowdhury, Rathish Das, Rob Johnson, and Michael A. Bender, “When Are Cache-Oblivious Algorithms Cache Adaptive?” under review in *30th Annual European Symposium on Algorithms (ESA'22)*.
- **Arghya Bhattacharya** “Progress Imbalance in Multi-process Performance,” *Graduate Research Day (2021), Dept. of Computer Science, Stony Brook University*.
- **Arghya Bhattacharya**, Dwaipayan Choudhury, and Debangshu Dey, “Edge-enhanced Bi-dimensional empirical mode decomposition based emotion recognition using fusion of feature set,” *Soft Computing, Springer (2018) 22: 889–903*.
- **Arghya Bhattacharya**, Dwaipayan Choudhury, and Debangshu Dey, “Emotion Recognition from Facial Image Analysis Using Composite Similarity Measure Aided Bi-dimensional Empirical Mode Decomposition,” *First IEEE Conference on Control, Measurement and Instrumentation (CMI'16)*.
- Mainak Biswas, **Arghya Bhattacharya**, and Debangshu Dey, “Classification of Various Colon Diseases in Colonoscopy Video using Cross-Wavelet Features,” *IEEE International Conference on Wireless Communications Signal Processing and Networking (WiSPNET'16)*.