

# ARCHAN RAY

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## EDUCATION

- University of Massachusetts, Amherst MA.** Ph.D. in Computer Science. September 2023  
*Thesis:* Sublinear Algorithms for Matrices: Theory and Applications. *Advised by* [Cameron Musco](#)
- Indian Statistical Institute, Kolkata.** M.Tech. in Computer Science. July 2015  
*Thesis:* Estimation of Facial Emotions for Emotion Synthesis. *Advised by* [Dipti Prasad Mukherjee](#)
- Jalpaiguri Government Engineering College, West Bengal.** B.Tech. in Computer Science. June 2013

## RESEARCH EXPERIENCE

- Graduate Research Assistant, University of Massachusetts, Amherst, MA** May 2017 - *present*
- Compared sublinear matrix-vector query methods for eigenvalue approximation (in preparation). *Sublinear Algorithms*.
  - Approximated symmetric matrices in their spectral norm using deterministic algorithms. Applications include PSD testing, singular value and singular vector approximations (in ITCS 2024 [[link to arxiv](#)]). *Sublinear Algorithms*.
  - Approximated all eigenvalues of symmetric matrices using random sampling (extended abstract in ICALP 2023 and full paper in Algorithmica 2024 [[link to arxiv](#)]). *Sublinear Algorithms, Randomized Algorithms*.
  - Approximated matrices, with applications to real world datasets arising in NLP (in AAAI 2022 [[link to arxiv](#)]). *Sublinear Algorithms, NLP*.
  - Created a database of annotated historical maps. Detect and recognize texts in historical maps (published as technical reports [[link to tech report 1](#)], [[link to tech report 2](#)]). *Computer Vision*.
- Visiting Research Scholar, Indian Statistical Institute, Kolkata, India** August 2015 - August 2016
- Designed an algorithm to detect and recognize objects from planogram images (in ECCV 2018 [[link to paper](#)], patented in 2020 [[link to patent](#)]). *Computer Vision, Graph Theory*.

## WORK EXPERIENCE

- Applied Research Intern, Amazon Web Services, New York, NY** Summers 2019, 2020
- Designed an algorithm for pseudo semi-supervised learning for short texts. *Unsupervised Learning, NLP*.
  - Designed an algorithm for visual question answering using transformer architecture. *Computer Vision, NLP*.
- Research Intern, TCS Innovation Labs, Gurgaon, India** Summer 2014
- Designed an algorithm for classification of images of human faces with emotions. *Computer Vision, SVMs*.
- Research Intern, Indian Space Research Organization (ISRO), Kolkata, India** Summer 2012
- Designed an algorithm to identify distinct signals in a hyperspectral image. *Game Theory, Signal Processing*

## LEADERSHIP EXPERIENCES

- University of Massachusetts, Amherst MA** August 2016 - *present*
- **Graduate Teaching Assistant.** Representing, Storing, and Retrieving Information (CS145), *Spring '21*; Algorithms for Data Science (CS514), *Spring '20*; Graduate Computer Vision (CS670), *Fall '19*; Graduate Machine Learning (CS589), *Spring '19*; Graduate Machine Learning (CS589), *Spring '17*; Introduction to Algorithms (CS311), *Fall '16*.
  - **Mentor.** CARE PhD Application Support Program; Undergraduate Research Volunteers; Masters students at the Computer Vision Lab.
  - **Co-organizing/Stewardship.** Machine Learning and Friends Lunch at UMass; Graduate Employee Organisation.

## TECHNICAL STRENGTHS

**Computer Languages & Tools** Python (Over 15000 LOC), C; Matlab<sup>®</sup>, PyTorch, Tensorflow, LibSVM.

## HONORS AND ACHIEVEMENTS

- Dissertation Writing Fellowship Award**, Manning College of Information and Computer Sciences, University of Massachusetts Amherst Spring 2023
- AAAI-22 Student Scholarship**, 36<sup>th</sup> AAAI Conference on Artificial Intelligence January 2022
- Best Dissertation in M.Tech. Computer Science**, Indian Statistical Institute, Kolkata July 2015