ATISHAY JAIN

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LinkedIn GitHub Google Scholar

EDUCATION

Brown University *September 2021 - Present*
Ph.D., Computer Science GPA: **4**/4

IIT (Indian Institute of Technology), Gandhinagar *August 2016 - July 2020*
B.Tech, Computer Science and Engineering | President's Gold Medalist GPA: **10**/10

SKILLS

Languages: Python, R, C, Java, C++
Libraries: PyTorch, PyTorch Geometric, Keras, Sklearn, NLTK, Spacy, Tensorflow

INTERNSHIPS

Caltech (California Institute of Technology); Prof. Mani Chandy; [May 2019 - July 2019]

- Developed algorithms in Python, for Caltech's IoTPy framework (which enables development of applications based on streaming data such as sensors, website/network monitoring, web-clicks, and audio signals)
- Programmed heavy hitter algorithms such as Misra Gries, Count-Min Sketch and Count Sketch, as well as an online version of Principal Component Analysis (PCA), a dimensionality reduction algorithm
- Created audio processing libraries for real time modifications such as reverberations and pitch shifting

IIT Gandhinagar; Prof. Anand Sengupta; [May 2018 - December 2019]

- Designed machine learning models, using Keras and PyTorch, to de-noise gravitational waves, allowing researchers to observe astronomical events such as binary black hole mergers
- Analysed neural network models, which use Recurrent Neural Networks (RNNs), Long Short Term Memory (LSTM) Cells with attention, Auto-Encoders, and Generative Adversarial Networks (GANs) to rapidly de-noise gravitational waves of varying signal-to-noise ratios
- Tested applicability of models in obtaining accurate gravitational wave time delays over multiple detectors using PyCBC and NumPy

Hewlett Packard Enterprise; Mr. Suhas Shivanna; [June 2017 - July 2017]

- Programmed a Generic Data Mining Domain Modeller using HTML and JavaScript, which would make it easy to collect telemetry data from enterprise network equipment for further analysis
- Researched and presented highlights of Quantum Key Distribution to the security project team

GRADUATE RESEARCH PROJECTS (BROWN UNIVERSITY)

Clustering Spatial Transcriptomics Data with Nested Graph Neural Networks; Prof. Ritambhara Singh; [Ongoing(August 2023 - Present)]

- Designed and implemented a nested graph neural network model in Pytorch Geometric for unsupervised clustering of spatial transcriptomics data to enable cell annotation and understand disease pathology
- Assessed model performance by comparing to state-of-the-art techniques, GraphST and MuCoST
- Presented the project as a poster at Intelligent Systems for Molecular Biology (ISMB), Montreal 2024 and Cold Spring Harbor Laboratory, 2024 New York, and submitted to ISMB 2025 for potential publication

Segmenting Large Microscopy Images using Graph Neural Networks; Prof. Ritambhara Singh; [August 2021 - August 2023]

- Developed a graph neural network-based framework using PytorchGeometric and Sklearn to perform semantic segmentation on large microscopy images to improve memory efficiency
- Compared to state-of-the-art methods such as UNets, our framework showed similar accuracy while requiring one to three orders-of-magnitude fewer computational resources
- Published in Microscopy journal and presented at Cold Spring Harbor Laboratory, 2022 New York

Investigating the Performance of Deep Learning Methods for Hi-C Resolution Improvement; Prof. Ritambhara Singh; [August 2020 - August 2022]

- Surveyed and reviewed multiple state-of-the-art models that upscale Hi-C data to reduce sequencing costs
- Tested all models on multiple datasets and metrics to identify advantages and disadvantages of the models and methods used to train them
- Published the work in the Genes journal

UNDERGRADUATE RESEARCH PROJECTS (IIT GANDHINAGAR)

Identifying Genes for Cancer Classification; Prof. Anirban Dasgupta; [August 2019 - December 2019]

- Implemented and tested a singular value decomposition based algorithm on gene expression data to select genes for breast and lung cancer classification
- Collaborated with Zydus Hospital, Ahmedabad for extending the solution to other cancer types

Feature Hashing and Fairness; Prof. Anirban Dasgupta; [January 2019 - April 2019]

- Analyzed the effect of feature sketching on fairness using Python
- Inspected change in accuracy and fairness (equal odds and equal opportunity) of a Support-Vector Machine (SVM) model, after hashing the input data

Defending Neural Networks Against Adversarial Attacks; Prof. Nipun Batra; [January 2019 - April 2019]

- Explored state-of-the-art defenses such as ensembles, defensive distillation, and Defense-GAN against adversarial attacks (FGSM attacks)
- Adapted (using Python and PyTorch) models used in denoising and data sketching for defense against adversarial attacks
- Benchmarked adapted models' performance against Defense GAN model in protecting a neural network

Detecting Insults in Social Commentary; Prof. Mayank Singh; [August 2018 - December 2018]

- Identified offensive comments on social media
- Used Python libraries NLTK and ScikitLearn for text pre-processing (Natural Language Processing), and machine learning classifiers such as logistic regression, neural networks and SVMs for identification

PUBLICATIONS

- **Jain A.**, Laidlaw D.H., Ma Y., and Singh R. Improved Spatial Transcriptomics Clustering with Nested Graph Neural Networks. Submitted to *Intelligent Systems for Molecular Biology (ISMB)*, July 2025 [conference_link]
- Murtaza G., **Jain A.**, Hughes M., Wagner J., and Singh R. A Comprehensive Evaluation of Generalizability of Deep Learning-Based Hi-C Resolution Improvement Methods. *Genes*, Dec 2023 [link] [journal_link]

- **Jain A.**, Laidlaw D.H., Bajcsy P., and Singh R. Memory-efficient semantic segmentation of large microscopy images using graph-based neural networks. *Microscopy*, Oct 2023 [link] [journal_link]
- Gohil V.*, Narayanan S.D.*, and **Jain A***. [Re] One ticket to win them all: generalizing lottery ticket initializations across datasets and optimizers. *ReScience C 6, 2, #4*, Feb 2020 [link] [journal_link]
- Dutta R.*, Gohil V.*, and **Jain A***. Effect of Feature Hashing on Fair Classification. *ACM India Joint International Conference on Data Science and Management of Data (CoDS-COMAD)*, Hyderabad, India, Jan 2020 [link] [conference_link]

INVITED TALKS AND POSTERS

Talk at CSHL Biological Data Science Meeting 2024, New York - Clustering Spatial Transcriptomics Data with Nested Graph Neural Networks

Poster at Intelligent Systems for Molecular Biology 2024, Montreal - Clustering Spatial Transcriptomics Data with Nested Graph Neural Networks

Talk at CSHL Biological Data Science Meeting 2022, New York - Scalable and memory efficient segmentation of large microscopy images using graph-based neural networks

Talk at PyData Gandhinagar 2018 - Applications of Machine Learning Across Domains

TEACHING ASSISTANT EXPERIENCE

Deep Learning in Genomics (Brown University) *Fall 2023*
Writing Lab (IIT Gandhinagar) *Spring 2019*
Computing (Python) (IIT Gandhinagar) *Fall 2017, Fall 2018*

HONORS AND RECOGNITION

- Awarded the President's Gold Medal for obtaining the highest GPA among all B.Tech students graduating in 2020 from IIT Gandhinagar.
- Awarded the Scholarship for Academic Excellence for obtaining first rank in class, IIT Gandhinagar for the years 2018-19, 2019-20
- Appeared on the Dean's list (higher than 9.0 Term GPA) for all semesters at IIT Gandhinagar
- Placed in the top 0.2% of IIT-JEE (Joint Entrance Examination), 2016 with over 1.1 million candidates
- Won HP Code Wars, Bangalore, 2015 - a prestigious high-school coding competition conducted by Hewlett Packard where approximately 100 teams participated

SERVICES

- Sub-reviewer for ICML, NeurIPS, ICLR, and RECOMB conferences.
- Co-founded Gandhinagar chapter of PyData and organised 4 meetups to expand membership over 1000