

RESEARCH INTERESTS

3D Computer Vision - Developing faithful (to geometry), generalizable, and dynamic 3D representations.

EDUCATION

- **Cornell University** Ithaca, NY
Doctor of Philosophy, Computer Science *Sep 2022 – Present*
- **Indraprastha Institute of Information Technology, Delhi** New Delhi, India
B. Tech., Computer Science & Applied Mathematics; CGPA: 9.24/10.00 *Aug 2016 – Jan 2021*
 - **Department Rank 1**
 - Received the [Innovative Student Projects Award](#) for **best thesis in Computer Science** from the Indian National Academy of Engineering. One of the highest honors for undergraduates in India.

PUBLICATIONS

Conferences & Journals

- **Aditya Chetan***, Brihi Joshi*, Hridoy Sankar Dutta*, Tanmoy Chakraborty. CoReRank: Ranking to Detect Users Involved in Blackmarket-based Collusive Retweeting Activities. In *12th ACM International Conference on Web Search and Data Mining (WSDM 2019)*. (Acceptance Rate: **16%**, CORE2018 A*)
- Udit Arora, Hridoy Sankar Dutta, Brihi Joshi*, **Aditya Chetan***, Tanmoy Chakraborty. Analyzing and Detecting Collusive Users Involved in Blackmarket Retweeting Activities. In *ACM Transactions on Intelligent Systems and Technology (TIST)*. (Impact Factor: **3.971**)
- Hridoy Sankar Dutta, **Aditya Chetan***, Brihi Joshi*, Tanmoy Chakraborty. Retweet Us, We Will Retweet You: Spotting Collusive Retweeters Involved in Blackmarket Services. In *The 2018 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM 2018)*. (Acceptance Rate: **15%**)

Other Publications

- **Aditya Chetan**, Guandao Yang, Zichen Wang, Steve Marschner, Bharath Hariharan. Accurate Differential Operators for Neural Fields. (*Under Submission at ICLR 2024*)
- **Aditya Chetan**, Nipun Kwatra. Distance Learner: Incorporating Manifold Prior to Model Training. In *The Second Workshop on Symmetry and Geometry in Neural Representations (NeurReps) at NeurIPS 2023*.
- Brihi Joshi*, Shravika Mittal*, **Aditya Chetan***. Did You “Read” the Next Episode? Using Textual Cues for Predicting Podcast Popularity. In *The First Workshop on NLP for Music and Audio at ISMIR 2020*.
- **Aditya Chetan**, Jennifer Guo, Leticia Mattos Da Silva, Jacob Ridgway, Silvia Sellán, Alec Jacobson. The Space of Signed Distance Fields. *Fields Undergraduate Summer Research Program 2021 Project Report*. [\[link\]](#)
- Nishtha Madaan, Gautam Singh, Sameep Mehta, **Aditya Chetan***, Brihi Joshi*. Generating Clues for Gender-based Occupation De-biasing in Text. [\[link\]](#)

*Equal contribution

RESEARCH EXPERIENCE

- **Cornell University** Ithaca, NY
Graduate Research Assistant *Sep 2022 - Present*
 - **Dynamic Scene Reconstruction from Monocular Videos**
Advised by: Prof. Bharath Hariharan & Prof. Noah Snavely
 - * Developing methods for the reconstruction of dynamic scenes from monocular videos.
 - * **Keywords:** *Non-Rigid SfM, Neural Fields*

- **Accurate Differential Operators for Neural Fields**

Advised by: Prof. Bharath Hariharan & Prof. Steve Marschner

- * Developed spatial differential operators for Hybrid Neural SDFs as an alternative to automatic differentiation.
- * Showed improved performance of Hybrid Neural SDFs in applications like rendering and physical simulation.
- * **Keywords:** *Geometry Processing, Signed Distance Fields, Hybrid SDFs*

- **Microsoft Research India**

Bengaluru, India (Virtual)

- *Research Fellow*

Sep 2021 - July 2022

- Research Intern*

Jan 2021 - Jun 2021

- **Geometry for Adversarial Robustness of Neural Networks [report]**

Advised by: Dr. Nipun Kwatra

- * Developed methods to improve adversarial robustness of DNNs by leveraging geometry of the data manifold.
- * Devised novel training schemes for DNNs. Empirically confirmed benefits on synthetic datasets.
- * Worked on scaling our methods to real-world datasets like MNIST and CIFAR-10.
- * Conducted a literature survey on Geometric Deep Learning to explore connections to Adversarial Robustness.
- * **Keywords:** *Adversarial Robustness, Topology, Deep Learning, Differential Geometry*

- **Fields Institute for Research in the Mathematical Sciences**

Toronto, Canada (Virtual)

- *Research Intern*

Jul 2021 - Aug 2021

- **The Space of Signed Distance Functions [report]**

Advised by: Silvia Sellán and Prof. Alec Jacobson

- * Developed methods for deforming/smoothing Implicit Surface Representations like SDFs directly.
- * Showed that surface fairing (in particular, MCF) is instantaneously equivalent to Gaussian smoothing of SDFs.
- * Reviewed, implemented, and analysed existing algorithms for smoothing implicit surface representations.
- * Proposed a neural network-based pipeline for processing SDFs to produce the effects of Mean Curvature Flow.
- * **Keywords:** *Geometry Processing, Signed Distance Fields, Mean Curvature Flow*

- **Indraprastha Institute of Information Technology, Delhi**

New Delhi, India

- *Undergraduate Researcher*

Aug 2020 - Aug 2021

- **Functional Maps for Non-isometric Shape Correspondence**

Advised by: Prof. Kaushik Kalyanaraman

- * Worked on open problems pertaining to shape registration, with a focus on the Functional Maps approach.
- * Reviewed literature such as the SIGGRAPH'17 course, landmark papers like Ovsjanikov et al. , Edelstein et al.
- * Reformulated the shape registration problem using recent advances in Computational Optimal Transport.
- * **Keywords:** *Geometry Processing, Shape Registration, Differential Geometry*

- **Max Planck Institute for Informatics**

Saarbrücken, Germany

- *Visiting Scholar*

Jul 2019 - Dec 2019

- Research Collaborator*

Jan 2020 - Aug 2022

- **Inferring and Modelling Users' Interests from Conversational Text [details]**

Advised by: Dr. Paramita Mirza and Prof. Andrew Yates

- * Worked on extracting preferences of users from conversational data to offer personalized recommendations.
- * Designed a framework for weakly supervised travel-related aspect extraction from conversational data.
- * Worked on developing novel methods for aspect-based neural information extraction, under minimal supervision.
- * **Keywords:** *Natural Language Processing, Weak Supervision, Knowledge Bases*

- **Laboratory for Computational Social Systems (LCS2), IIT Delhi**

New Delhi, India

- *Undergraduate Researcher*

Jan 2018 - Jan 2021

- **Understanding adversarial collusive activities in OSNs (Undergraduate Thesis)**

Advised by: Prof. Tanmoy Chakraborty

- * Worked on detecting collusive retweeters on Twitter, focusing on users of freemium blackmarket services.
- * Curated an open data set of manually annotated users from various freemium services.
- * Proposed a novel set of features for detection and tested its effectiveness on several machine learning models.

- * Developed an unsupervised and semi-supervised approach for detection of collusive retweeters.
- * **Keywords:** *Machine Learning, OSNs, Data Science*

- **IBM India Research Laboratory**

Undergraduate Researcher

New Delhi, India

Nov 2017 - Mar 2019

- **Occupational Debiasing** [code][paper]

Advised by: Dr. Sameep Mehta

- * Proposed a pipeline to detect occupational gender bias in text, accounting for demography and time period.
- * Developed a web app implementing the pipeline, and curated a dataset for evidence-based bias detection.
- * **Keywords:** *NLP, Machine Learning, Flask*

TEACHING EXPERIENCE

- **Indraprastha Institute of Information Technology, Delhi**

Teaching Assistant with Prof. Tanmoy Chakraborty

New Delhi, India

Jan 2020 - Jun 2020

- **CSE559 Mining Large Networks**

- * Sole TA of the first offering. Created assignments, exams, conducted office-hours, and mentored student projects.
- * Assisted with lecture content and contributed chapters to a book written by the instructor for the course.
- * Received positive feedback from the class that included junior and senior-year UG, PG, and Ph.D. students.
- * Also delivered two lectures in the course on the topic, "Information Cascades in Networks".

INDUSTRY EXPERIENCE

- **Goldman Sachs**

Summer Analyst

Bengaluru, India

Jun 2020 - Jul 2020

- **R&D Engineering Team**

- * Developed NLP tools for automating Client Onboarding procedures at Goldman Sachs.
- * Built a Named Entity Recognition (NER) pipeline for recognizing person entity names from a variety of financial documents (Prospectus, Annual Reports, LLC, LP Agreements, etc.), using minimal labeled data.
- * Implemented data augmentation, masking techniques, and post-processing heuristics to improve performance.
- * **Keywords:** *NLP, Named Entity Recognition, Deep Learning*

- **Philips India**

Research Intern

Bengaluru, India

May 2019 - Jul 2019

- **Radiology & Cardiology Informatics Team**

- * Built Narrative AI, a system for extracting clinical facts and entities from doctor-patient conversations.
- * Wrote a web app as an end-to-end system to record conversations, handwritten text and display entities.
- * Created a digital prescription board to identify medical terms from Handwritten text.
- * Designed an NLP pipeline incorporating text-preprocessing, clinical NER, and information extraction.
- * Surveyed the contemporary literature in Clinical NER and highlighted the open problems in our work.
- * **Keywords:** *Data Science, NLP, Healthcare, Python, MetaMap*

- **Microsoft India**

Global Delivery Intern

Hyderabad, India

Jun 2017 - Jul 2017

- **Emerging Capabilities group**

- * Creation and integration of chat-bots into the workflow of the MS Sales team, to help handle clients.
- * Learned how to write web apps using the MVC framework in C# following Agile principles.
- * Developed an FAQ chat-bot for new hires of my team, to help them with beginner questions.
- * Used Azure Cloud Services to deploy apps and gained experience in troubleshooting deployed apps.
- * **Keywords:** *Chat-bots, Microsoft Bot Framework, Microsoft Azure, Agile, C#, .NET*

AWARDS




- **Cornell University Fellowship**: Financial support for the academic year 2022-23 for doctoral studies at Cornell.
- **INAE Innovative Student Projects Award 2021**: Awarded for **best thesis** at the undergraduate level in Computer Engineering and Information Technology discipline. One of the **highest honors** for undergraduates in India.
- **Fields Undergraduate Summer Research Program 2021**: One of **36 selected** students from **150+** applicants for a funded research opportunity at the **Fields Institute, Canada**.
- **LOGML Summer School 2021**: Selected as a student attendee. (One of **100 selected** out of **450+** applicants). Undertook a **week-long project** on Self-supervised Non-Rigid Shape Registration with **Oshri Halimi** (Technion, Israel).
- **Lisbon ML Summer School 2021**: Selected as a student attendee from **750+** applications. [[certificate](#)]
- **Dean's Award for Academic Excellence**: For **excellent academic performance** in the 2018-19 academic session.
- **Google Travel Grant**: Awarded full travel support of 2800 USD for visiting WSDM 2019
- **Dean's Award for Innovation R&D**: For **high quality** research *beyond coursework* in the 2017-18 academic session.
- **Best Technical Poster Runner-up at GHCI 2018**: Received for the project, "Generating Clues for Gender-based Occupation De-biasing in Text" done in conjunction with **IBM India Research Laboratory**.

SKILLS

- **Courses**: [Computer Vision](#)[†], Linear Algebra, Probability and Statistics, Real Analysis, ODEs & PDEs, Calculus in \mathbb{R}^n [†], Scientific Computing, Numerical PDEs[†], Differential Geometry, Linear Optimisation, Deep Learning[†], Machine Learning, Natural Language Processing[†], Speech Recognition[†], Affective Computing[†], [Geometric Deep Learning](#)[§]
- **Tools & Technologies**: Python, Java, C#, MATLAB, gptoolbox, NumPy, Pandas, PyTorch, git, Flask, Docker

([†]Graduate level course, [§]MOOC)

PROJECTS

- **Auto-Decoder++: Towards a faster Auto-Decoder** [[report](#)]
 - Proposed a method to speed up Auto-Decoder training through better latent code initialization.
 - Showed faster convergence and improved latent space structure Vs. vanilla Auto-Decoders for image representation.
 - **Keywords**: *Auto-Decoders, Generative Modelling*
- **DiffGeoOps** [[code](#)] ★ 32 🗳 5 on 
 - Python library implementing different algorithms for computing discrete curvature for triangulated 2D manifolds.
 - Can generate plots of Mean Curvature, Gaussian Curvature and Principal curvatures for given 3D meshes.
 - **Keywords**: *Differential Geometry, Geometry Processing*
- **Virtual Element Methods** [[code](#)][[report](#)] ★ 6 on 
 - Reviewed literature on the Virtual Element Methods for solving Partial Differential Equations.
 - Implemented a solver for two dimensional Poisson equation on general polygonal meshes in Python.
 - **Keywords**: *Virtual Element Methods, Finite Element Methods, PDE Solver*
- **Triplet Training for Podcast Popularity** [[code](#)][[paper](#)][[talk](#)]
 - Used triplet training technique to counter the inherent class imbalance in podcast popularity prediction.
 - UG-only team project, accepted at the [NLP4MusA workshop](#) at ISMIR 2020 (proceedings on [ACL Anthology](#)).
 - **Keywords**: *Deep Learning, NLP, Representation Learning*
- **Emotional Text-to-speech** [[webpage](#)][[slides](#)] ★ 311 🗳 46 on 
 - Developed over Tacotron and HTS toolkit for emotional speech synthesis for English.
 - Explored fine-tuning approaches for pre-trained models to synthesize emotional speech using ~15 mins. of audio.
 - **Keywords**: *Deep Learning, Speech Synthesis, HMM*

- **Deep Multi-task Piano Transcription** [\[report\]](#)
 - Developed over [Google Magenta's Onsets and Frames](#) work for polyphonic piano transcription
 - Devised a smaller architecture inspired by the paper achieving comparable results in shorter training times.
 - **Keywords:** *Deep Learning, MIR*
- **img2 \LaTeX** [\[demo\]](#)[\[code\]](#)[\[slides\]](#) ★ 16 ♪ 5 on [🔔](#)
 - An end-to-end model for converting handwritten mathematical expressions to compilable \LaTeX
 - Made use of image segmentation, supervised classifiers such as CNNs, SVM, etc. and heuristics for conversion.
 - **Keywords:** *Machine Learning, Deep Learning, Image Processing*
- **SemEval19 Task 3: EmoContext** [\[report\]](#)
 - Worked on the task of contextual emotion detection in text. This was a shared task for a workshop at ACL 2019.
 - Used deep learning models like LSTMs, DeepMoji and ELMO for trying to increase accuracy.
 - **Keywords:** *NLP, Sentiment Analysis, Deep Learning*
- **IEDatron: Gesture Mimicking Robot** [\[details\]](#)
 - This project aims to improve a human's ability to control a robot, through a robot that copies its actions.
 - Built using a Microsoft Kinect v1.8, an Arduino Mega, HC-05 Bluetooth module and Servo motors.
 - Was amongst the top 10 projects in the first-year batch and received a mention in the Director's blog [\[link\]](#)
 - **Keywords:** *Computer Vision, Robotics, IoT*

CO-CURRICULAR ACTIVITIES

- **Cornell URM Graduate School Application Support:** Advised students from under-represented minorities on their graduate school applications for Cornell for Fall 2023.
- **SIGGRAPH Research Career Development Committee:** Member since February 2021. Part of the [Undergraduate Mentoring](#) Sub-committee.
- **Student Mentor at IIITD:** Mentored first-year undergraduates, helping them adjust to college life.
- **Student Volunteer at COLING 2020:** Helping conduct the premier NLP conference virtually.
- **Volunteer at IIITD Summer Camp 2017:** Taught middle-school children from Govt. Schools concepts in Maths, Science, and provided career counselling. [\[press release\]](#)
- **Talks:**
 - **Introduction to ML:** Introduced a typical ML pipeline and talked about various paradigms of learning (Supervised, Unsupervised, etc.), some basic algorithms and the math behind them. [\[notebook\]](#)
 - **Mathematics of ML:** A DIY talk to demonstrate the mathematics behind basic machine learning models. Delivered at a [Women Who Code Delhi](#) meetup. [\[notebook\]](#)
 - **Maths in \LaTeX :** Short talk on how to use \LaTeX for writing mathematical content delivered at the Évariste Mathematics club at IIIT Delhi. [\[slides\]](#)
- **Clubs**
 - Founding member of the Évariste Maths club at IIIT Delhi. Link to the club's ideation doc: [\[link\]](#)
 - Core team member of Google Developer Student club at IIIT Delhi from 2019 - 2020 [\[certificate\]](#)