

# Anand Brahmbhatt

Google Research India

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## EDUCATION

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**Indian Institute of Technology Delhi**

*B.Tech in Computer Science and Engineering*

Advisors: Prof. Parag Singla & Prof. Mausam

2018 - 2022

**GPA: 9.685/10**

**Department Rank 5**

## WORK EXPERIENCE

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**Google Research India**

*Pre-Doctoral Researcher*

Advisors: Dr. Rishi Saket & Dr. Aravindan Raghuvier

Worked on privacy and learnability of aggregated data

Jul 2022 - Present

**Adobe Research**

*Research Intern*

Advisors: Dr. Shiv Saini & Dr. Atanu R Sinha

Worked on designing fairer methods for cloud-based resources allocation

May 2021 - Aug 2021

## PUBLICATIONS & PATENTS

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### Conference Publications

\* - equal contribution

#### 1. PAC Learning Linear Thresholds from Label Proportions

[NeurIPS'23]

Anand Brahmbhatt\*, Rishi Saket\* and Aravindan Raghuvier.

*Spotlight @ Neural Information Processing Systems (NeurIPS), 2023*

### Preprints

#### 4. Label Differential Privacy via Aggregation

[Preprint-1]

Anand Brahmbhatt, Rishi Saket, Shreyas Havaldar, Anshul Nasery and Aravindan Raghuvier.

*arXiv:2310.10092, 2023*

#### 3. LLP-Bench: A Large Scale Tabular Benchmark for Learning from Label Proportions

[Preprint-2]

Anand Brahmbhatt\*, Mohith Pokala\*, Rishi Saket and Aravindan Raghuvier.

*arXiv:2310.10096, 2023*

#### 2. Towards Fair and Calibrated Models

[Preprint-3]

Anand Brahmbhatt, Vipul Rathore, Mausam and Parag Singla

*B.Tech Project, Computer Science and Engineering, IIT Delhi, 2021 - 22 (under review @ AAAI 2024)*

#### 1. Measures of Closeness to Cordiality for Graphs

[Preprint-4]

Amitabha Tripathi, Anand Brahmbhatt and Kartikeya Rai

*preprint, 2023*

### Patents

#### 1. Cloud-Based Resource Allocation Using Meters

[Patent'23]

Atanu R Sinha, Shiv Kumar Saini, Sapthotharan Nair, Saarthak Marathe,

Manupriya Gupta, Anand Brahmbhatt, Ayush Chauhan

*US Patent number 20230259403, 2023*

## AWARDS AND HONORS

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- **Department Rank 5** amongst 90+ students in the CSE Department at IIT Delhi

2018 - 2022

- **All India Rank 917** in JEE Advanced (IIT-JEE) 2018 among 150,000 candidates

2018

- Awarded KVPY Fellowship from Government of India - **All India Rank 514**

2018

- Awarded Certificate of Merit for being in **Institute Top 7%** in semesters I, II, III and VI at IIT Delhi

2018 - 2022

## RESEARCH PROJECTS

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### Algorithms for Aggregated Data

Google Research India

Advisors: Dr. Rishi Saket & Dr. Aravindan Raghuvver

#### ❖ Learning from Label Proportions (LLP) with Linear Thresholds (LTFs)

Sep 2022 - Feb 2023

- Studied the **NP-Hard LLP with LTF** problem after imposing realistic **distributional assumptions**
- Proposed a **PCA** based algorithm to PAC learn LTFs (in this relaxed case) with **polynomial sample complexity**
- Work to be presented as **Spotlight paper (top 3% of all submissions)** at NeurIPS 2023 **[NeurIPS'23]**

#### ❖ Aggregation algorithms for Differential Privacy

Feb 2023 - Sep 2023

- Studied the implications of random aggregation to attain **label differential privacy** (label DP)
- Suggested two aggregation methods for label DP: one **without noise**, the other with **minimal additive noise**
- Established the dependence of privacy and utility on bag size and number of bags for both mechanisms **[Preprint-1]**

#### ❖ Benchmark for Learning from Label Proportions (LLP)

Jul 2022 - May 2023

- Created a **benchmark of LLP datasets** by Criteo CTR prediction dataset using different realistic techniques
- Introduced **metrics** to assess **LLP dataset learnability** and demonstrated benchmark diversity using these metrics
- Evaluated **9 SOTA LLP techniques** on our benchmark and provided insights to aid future exploration **[Preprint-2]**

### Bias Amplification in Deep Networks

B.Tech Project, IIT Delhi

Advisors: Prof. Parag Singla & Prof. Mausam

Sep 2022 - Feb 2023

- Proved that **Proportional-Equality Definition** is an implication of **group-wise calibration**
- Posited modifications of existing calibration techniques to attain group-wise calibration
- Analysed tradeoffs of these techniques between fairness and calibration **[Preprint-3]**

### Fairer Cloud Resource Allocation

Adobe Research

Advisors: Dr. Shiv Saini & Dr. Atanu R Sinha

May 2021 - Aug 2021

- Designed a **Shapley-Value** based approach for fairer cloud resource allocation using historic **meter** (usage metrics) data
- Presented a fresh method for pinpointing the **most suitable meters** for resource allocation
- Identified resource under-utilization by modelling ideal utilization on internal Adobe usage data **[Patent'23]**

### Quantifying Closeness to Cordiality of Graphs

Summer Research Project, IIT Delhi

Advisor: Prof. Amitabha Tripathi

Apr 2020 - Jul 2020

- Proposed two measures of **distance from cordiality** for graphs
- Computed these measures or bounds on these measures for general classes of graphs
- Proved an overarching theorem of bound on these measures under graph join operations **[Preprint-4]**

## RELEVANT COURSES

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#### Mathematics

Real & Complex Analysis, Probability & Stochastic Processes, Linear Algebra & Differential Equations, Calculus

#### Computer Science

Discrete Mathematical Structures, Theory of Computation, Analysis & Design of Algorithms, Machine Learning, Artificial Intelligence, Natural Language Processing, Database Management Systems, Data Structures & Algorithms, Operating Systems, Computer Networks

#### Electrical Engineering

Signal & Systems, Computer Architecture, Digital Logic & System Design

## EXTRA CURRICULAR ACTIVITIES

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- **Academic Mentor** for the introductory Applied Mechanics course at IIT Delhi

Jul 2019 - Dec 2019

- Board of Student Welfare **Student Mentor** to four incoming freshmen at IIT Delhi

2020-2022