

# Anand Brahmhatt

Google Research India

🏠 [Homepage](#)

✉ [anandbrahmhatt27@gmail.com](mailto:anandbrahmhatt27@gmail.com)

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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 and Prof. Mausam

2018 - 2022

GPA: 9.687/10

## WORK EXPERIENCE

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**Google Research India**

*Pre-Doctoral Researcher*

Advisors: Dr. Rishi Saket & Dr. Aravindan Raghuvier

**Description:** Worked on privacy and learnability of aggregated data.

Jul 2022 - Present

**Adobe Research**

*Research Intern*

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

**Description:** 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 Brahmhatt\*, Rishi Saket\* and Aravindan Raghuvier.

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

### Preprints

3. **Label Differential Privacy via Aggregation.**

[Preprint-1]

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

*arXiv: , 2023 (under review @ ITCS 2024).*

2. **LLP-Bench: A Large Scale Tabular Benchmark for Learning from Label Proportions.**

[Preprint-2]

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

*arXiv: , 2023.*

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

[Preprint-3]

Amithbha Tripathi, Anand Brahmhatt 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 Brahmhatt, Ayush Chauhan

*US Patent number 20230259403, 2023.*

### Undergraduate Thesis

1. **Towards Fair and Calibrated Models.**

[Preprint-4]

Anand Brahmhatt, Vipul Rathore, Parag Singla and Mausam

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

## 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 to achieve label differential privacy with **little/no additive noise**, respectively.
  - 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]**

### 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]**

### Bias Amplification in Deep Networks

B.Tech Project, IIT Delhi

Advisors: Prof. Parag Singla and 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-4]**

### 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-3]**

## RELEVANT COURSES

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### Mathematics

Real & Complex Analysis, Probability & Stochastic Processes, Discrete Mathematical Structures, Linear Algebra & Differential Equations, Calculus.

### Computer Science

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

### Electrical Engineering

Signal and Systems, Computer Architecture, Digital Logic and System Design.

## EXTRA CURRICULAR ACTIVITIES

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- Acted as an **Academic Mentor** for the introductory Applied Mechanics course at IIT Delhi. *Jul 2019 - Dec 2019*
- Provided **student mentorship** to four undergraduate students in the CSE Department at IIT Delhi. *2020-2022*