ATHARV GOEL

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Education

- **IIIT Delhi** *2021 - 2025*
  B.Tech in Computer Science & Engineering CGPA: 8.83/10.00

Research Experience

- **Infosys Centre for Artificial Intelligence (CAI), IIIT Delhi** *Dec 2023 - July 2025*
  Undergraduate Thesis | Supervisor: Prof. Saket Anand | Thesis PDF New Delhi, India
  - Formulated a semi-supervised active learning framework for object detection combining foundation models with human-in-the-loop annotation.
  - Designed a novel data selection method based on neural collapse, enabling better generalization with lower supervision.
  - Accepted to **NeurIPS 2025** Workshop on Reliable ML; follow-up under review at **ICASSP 2026**.

- **Datalab, IIIT Delhi** *Jan 2025 - Jun 2025*
  Undergrad Researcher | Supervisor: Prof. Gautam Shroff New Delhi, India
  - Explored training deep RL agents to acquire core knowledge priors via demonstration learning in procedurally generated 2D grid environments.
  - Investigated meta-learning, TTA, inverse RL, pretraining, knowledge distillation, and open-ended learning to allow agents to construct and transform symbolic objects.

- **Wildlife Institute of India** *June 2024 - Aug 2024*
  Research Intern New Delhi, India
  - Designed algorithms for Wildlife Reidentification under incomplete data with graph registration, subgraph matching, 3D vision and domain knowledge.

- **Theoretical Computer Science Lab, IIIT Delhi** *June 2023 - Aug 2023*
  Research Intern | Supervisor: Prof. Supratim Shit New Delhi, India
  - Implemented and benchmarked core-set construction algorithms for feature selection in high-dimensional regression tasks. Conducted theoretical analyses of core-set algorithms.

Publications

[1] **Atharv Goel***, Sharat Agarwal*, Saket Anand, Chetan Arora. **Reliable Active Learning from Unreliable Labels via Neural Collapse Geometry**. *NeurIPS 2025 Workshop on Reliable ML.*

[2] Sharat Agarwal*, **Atharv Goel***, Saket Anand, Chetan Arora. **NCAL: Neural Collapse-Guided Active Learning for Robust and Generalizable Representations**. *Under Review at ICASSP 2026.*

[3] **Atharv Goel**, Mehar Khurana. (2025). **Just Add Geometry: Gradient-Free Open-Vocabulary 3D Detection Without Human-in-the-Loop**. arXiv preprint. *DOI: arXiv:2507.13363*

Professional Experience

- **TBO.COM** *June 2025 - Present*
  Software Engineer Gurugram
  - Building a travel distribution platform for serving flight & hotel bookings to travel agencies internationally. Developing with **NextJS and Amazon Web Services.**

Projects

- **OV3D: Open Vocabulary 3D Object Detector Without 3D Supervision** *Mar 2024*
  Tools: Python, PyTorch **[Paper | Code]**
  - Proposed a training-free, annotation-free pipeline for open-vocabulary 3D detection, built on 2D vision-language foundation models and classical geometric reasoning. Competitive performance to training-based baselines.
  - Contributed a novel dataset for evaluating under adverse weather conditions and absence of depth information, featuring pseudo-LiDAR from ring cameras and realistic fog injected to NuScenes.

- **ARC: Neural Analogical Reasoning for Artificial General Intelligence** *Sep 2024 - Nov 2024*
  Tools: Python, PyTorch, transformers **[Paper]**
  - Collection of techniques for tackling the ARC-AGI benchmark for general intelligence.
  - Investigated Neurosymbolic AI, designing algorithms using discrete program search, meta-learning, and LLMs.
  - Features a custom LLM inferencing method, and performs self-supervised test-time adaptation with LoRA.

- **Explainable Neural Networks for Computer Vision** *Apr 2025*
  Tools: Python, PyTorch
  - Made computer vision models **interpretable** by generating spatially localized concept heatmaps, using LLMs to generate concepts for each class.
  - Built a spatial bottleneck module for concept classification, providing both spatial heatmaps and global concept explanations.
- **VXGI: 3D Graphics Rendering Engine** *Oct 2023 - Dec 2023*
  Tools: C++, OpenGL [**Paper** | **Code**]
  - Rendering engine from scratch in pure OpenGL, featuring **real-time global illumination** and interactive GUI.
  - Implemented a dynamic voxelization scheme combined with voxel cone tracing for indirect lighting, achieving interactive performance **(50-60 FPS)** even in complex dynamic mesh blocks.
- **Distributed Hash Table: Raft Algorithm** *Apr 2024*
  Tools: Python, gRPC [**Code**]
  - Implemented a **Distributed Key-Value Store** using a custom **Raft Consensus algorithm** implementation to ensure fault tolerance and consistency, operating through leader election and log replication.
  - Integrated **leader lease** mechanism to reduce the time complexity of read operations, demonstrating significant gains for geo-distributed databases.

Skills

- **Programming Languages:** Python, C, C++, JavaScript, TypeScript, SQL
- **Technologies:** Amazon AWS, Linux, Git, GitHub, PyTorch, OpenCV, Numpy, Scikit-Learn, fastAI, NextJS

Coursework

- **Graduate:** Meta-Learning, Reinforcement Learning, Explainable AI, Computer Vision, Linear Optimization, Distributed Systems; **Undergrad:** Computer Graphics, Game Theory, Statistical Machine Learning

Awards

- **Best Teaching Assistant Award (2025)**: Received excellent feedback as Head TA from both students and faculty.
- **Dean's List for Academic Excellence (2024-2025)**: Awarded for achieving a **9.5 GPA** in final year.
- **Distinguished Academic Excellence Award (2025):** sole recipient from my batch - awarded for achieving the **top rank (A+)** in three graduate-level AI courses within one year: *Computer Vision*, *Explainable AI*, and *Meta-Learning*.
- **Amazon ML Summer School (2024):** Selected among top 3% out of 85,000 participants.
- **World Cube Association:** Ranked **top-100 among 20+ million** candidates for competitive speedcubing all over India.

Responsibility & Volunteering

- **Head Teaching Assistant – Computer Vision** *Jan 2025 - May 2025*
  IIIT Delhi
  - Managed a team of 7 TA's; mentored student teams on various research projects; designed tutorials, assignments and exams; conducted office hours for 1-to-1 tutoring.
- **Placement Cell Coordinator** *Feb 2023 - Mar 2024*
  IIIT Delhi
  - Facilitated operations between industry and students for placements. Hosted 30 startups at the IIITD Startup Fair.
- **Founder** *Dec 2020 - Aug 2025*
  The DASA Community
  - Built and maintained a community of **2,000+** foreign students from **15+** countries.
  - Established a mentorship system and wrote wiki pages and articles to help students navigate the process.
- **Organizer, ESYA 2023** *Jun 23 - Aug 23*
  IIITD Tech Fest
  - Independently conducted one of India's largest Speedcubing contests, affiliated with the **World Cube Association**, featuring **160+ competitors** from **3 countries** competing for **Rs. 2.5L+** in prizes.
- **Founding Member and Mentor,** Undergraduate Research Council (URC, IIITD) *Sep 2023 - May 2025*
- **Freshman Student Mentor,** Student Council *Aug 2023*

Certifications

- **GPU Programming Specialization:** Certificate *Nov 2024*
- **Amazon ML Summer School 2024:** Certificate *Aug 2024*
- **Machine Learning Engineering for Production (MLOps)** Certificate *May 2024*
- **Generative Adversarial Networks (GANs)** Certificate *May 2024*