Ayush Abhay Shrivastava

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Research Interests

Machine Learning, Computer Vision, AI Safety and Alignment, NLP

Education

Indian Institute of Technology, Delhi 2021 – 2025
Bachelor of Technology in Electrical Engineering *GPA - **8.689**/10*
Minor Specialization in Computer Science

Publications

Conference

- Rohith Peddi, Saurabh, **Ayush Abhay Shrivastava**, Parag Singla, Vibhav Gogate, "Towards Unbiased and Robust Spatio-Temporal Scene Graph Generation and Anticipation", *The IEEE/CVF Conference on Computer Vision and Pattern Recognition, 2025* *[Accepted as Highlight Paper]*

Awards and Honors

- **CVPR Travel Support Award** awarded competitive travel funding to attend and present research at CVPR *(2025)*
- Joint Entrance Examination (**JEE Advanced**): All India Rank **472** among 200,000+ candidates nationwide *(2021)*
- Joint Entrance Examination (**JEE Main**): All India Rank **823** among 1.1 million+ candidates nationwide *(2021)*
- **CBSE Merit Award**: Conferred with an award for scoring a perfect score in CBSE Board exam *(2019)*
- **NTSE**: Qualified for Stage 2 of NTSE, one of India's most competitive national scholarship examinations *(2019)*

Research Experience

Data Analytics and Intelligence Research (DAIR) Group IIT Delhi, India
B.Tech Thesis Project (Advisor: Prof. Parag Singla, Prof. Vibhav Gogate) *August 2024 – Dec 2024*

Unbiased and Robust Spatio-Temporal Scene Understanding Frameworks

- Developed *ImparTail*, a new training framework combining **curriculum learning** and **loss-masking** to substantially reduce bias toward head classes in spatio-temporal scene graph generation and anticipation
- Introduced two new benchmark tasks — **"Robust Spatio-Temporal Scene Graph Generation"** and **"Robust Scene Graph Anticipation"** — to evaluate model resilience under distribution shifts
- Achieved significant gains in unbiased metrics on the Action Genome dataset, demonstrating stronger performance on under-represented (tail) relationship categories compared to existing baselines
- Accepted as a **CVPR 2025 Highlight Paper**, recognized among the top **10%** of accepted papers for its contribution to fair and robust video scene understanding

Design Project (Advisor: Prof. Parag Singla, Prof. Vibhav Gogate) *Dec 2024 – Aug 2025*

Temporal Logic Rule Extraction for Video Scene Understanding

- Developed a temporal rule extraction framework for the Action Genome dataset to enforce **Temporal Logic** (TL)–based constraints and improve structural consistency in probabilistic scene graph (PSG) models
- Implemented a multi-stage video reasoning pipeline using **Chat-UniVi** for summarization and **LongVU** for dense captioning, followed by template-based question parsing and translation of affirmative answers into TL predicates
- Improved logical and temporal consistency in probabilistic scene graph (PSG) generation by integrating extracted temporal rules as prior constraints guiding structure learning and inference

Global Risk and AI Safety Preparedness (GRASP) Remote
Research Contributor *Jan. 2025 – Feb. 2025*

- Authored two analytical articles for the database presented at **AI Safety Connect (Paris AI Action Summit) 2025**, synthesizing technical literature on **world model** hierarchies and **design-time safety guarantees**
- Conducted a focused technical analysis of **latent adversarial training** techniques, investigating their implications for building **safe-by-design AI** architectures

Sekant Security Remote

AI Research Intern *Mar 2025 – June 2025*

Transformer-Based Enhancements for Phishing Detection

- Integrated a **DETR**-based visual backbone into Lin, et al.'s Phishpedia framework to improve phishing website recognition, achieving **2×** faster inference while maintaining accuracy on the **Phish-30K** benchmark
- Experimented with **MobileFormer** architectures for logo recognition and classification, analyzing trade-offs between model compactness and detection accuracy
- Investigated object classification vs object detection objectives for phishing page analysis, identifying detection-based learning as the more effective approach for robust logo-based phishing detection

Work Experience

Eightfold.ai Noida

Engineering Intern *May 2024 - June 2024*

- Implemented bulk profile management services, optimizing data ingestion for the AI matching engine
- Established automated **Pytest** pipelines validating API contracts, ensuring data integrity for **NLP parsing**

LG Ad Solutions Bangalore

Software Engineer 1 *Aug. 2025 - Present*

- Optimized InfluxDB write-paths, boosting ingestion by 18% for real-time ML inference monitoring
- Hardened **ArgoCD** pipelines via **RBAC**, securing **GitOps** deployments for latency-sensitive **RTB** models

Projects

Object-Centric Learning **Deep Learning**

Prof. Parag Singla *Apr. 2024 – May 2024*

- Implemented **Slot Attention** on CLEVRTex to disentangle object representations, improving model explainability
- Trained slot-conditioned **diffusion model** with **VAE** integration and compared performance to slot attention
- Implemented diffusion model as **Unet**, which comprised of various **Residual** blocks and **Transformer** blocks

Automated Math Problem Solving with Seq2Seq Models **Deep Learning**

Prof. Parag Singla *Mar. 2024 – Apr. 2024*

- Developed **Seq2Seq** models to generate and solve complex math formulas from word problems using an evaluator
- Used **Bi-LSTM** with GloVe embeddings and **Bahdanau attention** for sequence generation, achieving **67%** exact match and **73%** execution accuracy through **beam search** decoding
- Finetuned **BERT** as encoder and evaluated to get an accuracy of **78%**(exact match) and **81%**(execution)

Graph Neural Networks for Node Classification **Data Mining**

Prof. Sayan Ranu *Mar. 2025 – Apr. 2025*

- Built a hybrid **GraphSAGE–MLP** model for node classification with multi-path feature aggregation
- Developed a heterogeneous **GNN** for multi-label prediction on bipartite user–product graphs
- Built an end-to-end ML pipeline with early stopping and checkpointing, evaluated via ROC-AUC and F1 metrics

Relevant Coursework

- **Mathematics & Probability**
  - Probability & Stochastic Processes
  - Linear Algebra & Differential Equations
  - Calculus
- **Computer Science & Machine Learning**
  - Data Structures & Algorithms
  - Deep Learning
  - Database Management Systems
  - Computer Architecture
  - Computer Vision
  - Analysis & Design of Algorithms
  - Machine Learning
  - Data Mining

Technical Skills

Languages: Python, C, C++, Java, Golang MATLAB, SQL, JavaScript
Software and Tools: PyTorch, NumPy, Pandas, Ollama, OpenCV, ONNX, Docker, Kubernetes, AWS, Pytest, LaTeX

Extracurriculars

- Guided 6 first-year students as a student mentor to ensure their comfort and smooth transition into IIT Delhi
- Volunteered for 80+ hours for National Service Scheme (NSS) activities at IIT Delhi