Neil Sharma

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Research Interests

Passionate about advancing **NLP** and **Federated Learning** through multimodal approaches, efficient model training, and innovative applications in conversational AI and privacy-preserving federated learning. With 2 years of research and 3 years of software engineering experience, I apply analytical thinking and machine learning techniques to solve complex problems and develop cutting-edge applications in computer science.

Education

University of Oregon — **Eugene, OR, USA**
PhD in Computer Science — *Sept. 2025 – Present*
- **Research Focus:** Privacy-preserving federated learning; designing a scalable machine-unlearning method that enables compliant data deletion without full retraining

Stevens Institute of Technology — **Hoboken, NJ, USA**
Master of Science in Computer Science | GPA: 3.82/4.0 — *May 2021*
- **Relevant Coursework:** Machine Learning, Deep Learning, Natural Language Processing, Advanced Algorithm Design & Implementation, Applied AI & Machine Learning for Systems and Enterprises, Data Mining

Manipal University — **Jaipur, India**
Bachelor of Technology in Computer Science & Engineering | GPA: 7.32/10 — *June 2018*
- **Relevant Coursework:** Engineering Mathematics, Artificial Intelligence, Data Structures, Operating Systems, Big Data Analytics

Research Experience

Distopia Lab, University of Oregon — **Eugene, OR, USA**
PhD Student — *Sept. 2025 – Present*
- Developed a computationally efficient federated unlearning method (**Caffeine**) to remove client data influence without full model retraining, eliminating heavy matrix operations and cutting complexity from $\mathcal{O}(n^3)$ to $\tilde{\mathcal{O}}(n^2)$ with just two forward-backward passes and minimal memory.
- Designed a gradient-based unlearning update executed entirely on the client side, requiring 0 additional communication and preserving privacy, leveraging local gradients to approximate the effect of removing client data instead of retraining from scratch, preserving over 90% of original model accuracy on remaining data.
- Recognized by advisor as a top-5 mentee among 35 students and proposed a novel federated-unlearning method within weeks of starting the PhD; served on the Middleware 2025 Artifact Evaluation Committee.
- **Graduate Teaching Assistant – Intro to Software Engineering:** Lead weekly labs for sophomore/junior cohorts; teach Git/GitHub (branching, PRs, reviews), Docker-based dev environments, testing/CI workflows

ISRO (RAC-S) at Malaviya National Institute of Technology — **Jaipur, India**
Research Fellow — *June 2024 – June 2025*
- Engaged as Research Fellow for **Indian Space Research Organization (ISRO)** ChatBot project, leveraging NLP expertise in high-impact research collaboration with ISRO's Regional Academic Centers for Space
- Led research for developing ISRO-specific ChatBot employing **multi-agent, multi-modal LLMs with RAG** for QA tasks, achieving **over 84% accuracy** on ISRO's website multi-modal data
- Developed novel trigger-based web scraping to extract ISRO data, constructing knowledge base for transformer-based architecture, improving accuracy by **10%** over baseline models
- Utilized LLM-based evaluation methods including ROUGE score, precision, recall, and F-1 score to evaluate RAG-based chatbot

Malaviya National Institute of Technology — **Jaipur, India**
Research Intern (Full-time) — *Aug. 2018 – July 2019*
- Developed state-of-the-art **hybrid deep learning model** in Python for video surveillance specializing in anomaly detection
- Deployed **CNN and capsule network architectures** on UCF crime dataset subset, achieving **74% accuracy**
- Optimized deep neural networks through rigorous hyperparameter tuning, resulting in **10% performance improvement** on testing datasets
- Applied OpenCV to extract frames from **500+ video recordings** capturing various scenarios including road accidents, human altercations, and explosions

Publications

[1] **Sharma, N.** "Caffeine: Computationally Efficient Federated Unlearning." *26th ACM/IFIP International Middleware Conference (Doctoral Symposium)*, Dec 2025, Nashville, TN, USA.
[2] Shrey Mishra, **Neil Sharma**, Antoine Gauquier, Pierre Senellart. "TheoremView: A Framework for Extracting Theorem-Like Environments from Raw PDFs." *ECIR 2025 - European Conference on Information Retrieval*, Apr 2025, Lucca, Italy.
[3] **Sharma, N.**, Mittal, N., Singh M. "MERIT: Multimodal Enhanced Retrieval and Integration of Text and images." *Conference Paper. ISAI 2025.*
[4] Tibrewal, G., **Sharma, N.**, Mittal, N. "DIVERGEMENT: Domain-Tailored, Small-Model Natural Language to SQL Pipeline for Space Research Domain." *Conference Paper. Submitted to AusDM 2025.*

Work Experience

Cisco (Webex) **San Jose, CA, USA**
Software Engineer *April 2022 – May 2024*

- Spearheaded development of crucial feature for Webex, slashing join times by **35%** through REST API implementation, leveraging JSON response over WebSocket messaging
- Revamped analytics capabilities for **60% of logs** by enhancing Kibana logging and metrics system, integrating new fields and metrics to streamline API call analysis and error tracking
- Supervised team of interns developing Python and C++ solution to mitigate integration test failures, achieving **90% reduction in failure rate** and bolstering CI/CD Jenkins pipeline stability
- Improved Ping timeout exceptions to fortify system resilience, managing average of **500 calls/day** with peak of 700 calls/day
- Significantly boosted service reliability and preemptive issue detection by **70%** through bug fixes, extensive unit and integration testing, and development of Grafana-based production dashboards

Chubb **Jersey City, NJ, USA**
Analytics Implementation Engineer, Chubb Associate *Aug. 2021 – April 2022*

- Integrated insurance rating models into production using Flask and Docker on Azure, resulting in **40% reduction in underwriting time**
- Collaborated with data scientists to gather requirements from **10K Excel raters**, enabling deployment of ML models utilizing CosmosDB and Docker containers
- Created AI Chatbot on Rasa framework training LSTM-based model capturing FAQ response and intent(s) of 150 users

Projects

Cell Phone Reviews Sentiment Analysis (Fall 2020): Deployed ML models in Python to perform sentiment analysis on **60K+ phone reviews** from Amazon. Implemented topic extraction algorithm (LDA) mining reviews of 5 cell phone brands. Achieved accuracies **95%** and F-1 score **96%** with KNN, Deep Neural Networks (TensorFlow) and BERT (ktrain).
Attrition Dataset Analysis (Spring 2020): Spearheaded team of 4 to develop model for employee attrition using different ML models for classification. Performed EDA with Pandas on employee attrition dataset containing 26 features and 9,500 samples. Achieved accuracies close to **85%** employing KNN, Random Forest, SVM, ANN and Decision Tree.

Technical Skills

Programming Languages: Python, C++
Machine Learning & AI: PyTorch, TensorFlow, OpenCV, NLTK, Neural Networks, LSTM, BERT, Computer Vision, Sentiment Analysis, Natural Language Processing, Federated Learning
Databases & Tools: SQL Server, MongoDB, Docker, Git/GitHub, Flask, REST APIs, CI/CD (Jenkins), Grafana, Kibana

Awards & Certifications

Certifications: Software Development Fundamentals from Microsoft | Machine Learning from Stanford University (Coursera) | Neural Networks & Deep Learning from DeepLearning.ai
Award: **1st Prize** – Summer 2020 Internship Hackathon, BNY Mellon, New York City, NY, USA