Anshuk Uppal

AI Researcher | Deep Learning & Generative Models

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Professional Summary

PhD candidate specializing in cutting-edge generative AI with **4+ years of research experience** across top-tier academic institutions and industry labs (Microsoft Research, Sony AI, NYU, RIKEN-AIP). Published at premier ML conferences including **NeurIPS (Spotlight, <3% acceptance)** and ICML. Expert in diffusion models, continuous normalizing flows, Bayesian deep learning and uncertainty quantification with demonstrated ability to translate theoretical advances into practical applications in computer vision.

Key Publications & Research Impact

Implicit Variational Inference for High-Dimensional Posteriors (NeurIPS 2023 Spotlight)
A. Uppal, K. Stensbo-Smidt, W. Boomsma & J. Frellsen
Spotlight presentation (top 3% of submissions) at world's leading ML conference. Novel approach to high-dimensional posterior approximation with broad applications to uncertainty quantification.

Denoising Multi-Beta VAE: Representation Learning for Disentanglement
A. Uppal, Y. Takida, C-H. Lai & Y. Mitsufuji
Pioneered novel non-linear diffusion framework for controllable music generation. Preprint available

Bounded Implicit Variational Inference (ICML 2022)
A. Uppal, W. Boomsma & J. Frellsen
Presented at premier machine learning conference workshop on distribution-free uncertainty quantification.

Research Experience

Research Scientist Intern *June 2025 - October 2025*
Microsoft Research *Reading, UK*

- **Led independent research project** on advancing state-of-the-art **image editing** capabilities using leading foundation models (Stable Diffusion 3, FLUX)
- Developing novel techniques for controllable and robust image manipulation at scale using **multimodal models**.

Research Scientist Intern *June 2024 - October 2024*
Sony AI *Tokyo, Japan*

- **Led independent research project** on controllable generation in novel non-linear Latent Diffusion Models.
- Innovated alternative to classifier-free guidance by bridging classical disentanglement approaches (β-VAEs) with modern diffusion architectures
- Demonstrated **superior disentanglement and controllability** compared to existing methods
- **Output**: First-author manuscript under review | Preprint with 1000+ views

Visiting Research Scholar *October 2024 - March 2025*
New York University *New York, USA*

- 6-month research collaboration with **Prof. Rajesh Ranganath's group** at CILVR and Courant Institute
- Pioneered novel sampling techniques to dramatically **improve diversity** in pretrained conditional diffusion models (Stable Diffusion)
- Discovered breakthrough training strategies for continuous normalizing flows and consistency models, **en-**

abling faster sampling
- **Output**: Manuscript under review at a top ML conference.

Research Scientist Intern *June 2019 - December 2019*
RIKEN-AIP *Tokyo, Japan*
- Scaled Natural Gradient Variational Inference for complex mixture distributions.
- Developed practical approximation techniques bridging Deep Neural Networks and Gaussian Processes
- Implemented efficient Bayesian Neural Network pruning, **reducing model size by 40% with minimal accuracy loss**

Education

PhD in Computer Science *2021 - Present (Expected 2025)*
Technical University of Denmark *Copenhagen, Denmark*
- **Research Focus**: Uncertainty Quantification and Robustness in Deep Generative Models
- **Advisors**: Prof. Wouter Boomsma (University of Copenhagen), Prof. Jes Frellsen (DTU)
- **Funding**: Prestigious fellowship from Center for Basic Machine Learning Research in Life Sciences (MLLS)
- Published at NeurIPS (Spotlight), ICML, with additional manuscripts under review

Master of Technology in Electronics & Communication *2020*
IIIT Bangalore *India*
- **CGPA**: 3.3/4.0
- **Thesis**: Multimodal Posterior Estimation in Bayesian Neural Networks using Natural Gradients (Distinction)
- Advanced coursework in deep learning, computer vision, and probabilistic machine learning

Technical Expertise

Programming & Tools	Python (Expert), C, BASH, Git, Docker
ML Frameworks	PyTorch (Advanced), JAX, Pyro, NumPyro, Hugging Face
Core Expertise	**Diffusion Models** (Stable Diffusion, FLUX, DDPM/DDIM, LDMs) **Generative Models** (VAEs, GANs, Normalizing Flows, Autoregressive Models) **Bayesian ML** (Variational Inference, MCMC, Uncertainty Quantification) **Optimization** (Natural Gradients, Adam variants, Second-order methods)
Applications	Computer Vision, Image/Video Generation & Editing, Music Generation

Teaching & Leadership

Teaching Assistant | *Technical University of Denmark*
- Deep Learning (02456) - Taught 200+ graduate students over 2 years (Fall 2022, 2023)
- Deep Learning for Industry (Special Course) - Designed curriculum for industry professionals (Dec 2021)

Co-Organizer | *Generative Modelling Summer School* | Copenhagen 2023
Led organization and provided teaching support for 100+ international participants from academia and industry

Research Interests & Future Directions

- **Next-Generation Generative Models**: Advancing diffusion models, flow matching, and stochastic interpolants for more efficient and controllable generation
- **Trustworthy AI**: Developing principled approaches to uncertainty quantification, robustness, and interpretability in deep learning
- **Foundation Models**: Scaling generative models and improving their controllability for practical applications