

# Anshuk Uppal

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## ACADEMIC DETAILS

Education	Institute/School	Year	CGPA/%
PhD candidate	Technical University of Denmark	Current	–
Integrated MTech. in ECE	IIT Bangalore, India	2020	3.3/4.0
Schooling (12th CBSE)	Indore Public School(Indore, India)	2015	83.4%

## EXPERIENCE

- **PhD Candidate** in the section for Cognitive Systems, DTU Compute (Sep '21 - current)
  - Broadly working on uncertainty and robustness in deep learning. I am supervised by associate professors [Wouter Boomsma](#)(DIKU) and [Jes Frellsen](#)(DTU). I am one of the first PhD students to be funded by the Center for Basic Machine Learning Research in Life Sciences([MLLS](#)).
  - Currently, I am excited about diffusion models, identifiability, and geometry-aided sampling.
- **Visiting Research Scholar** at Courant Institute and Center for Data Science, NYU (Oct '24 - March '25)
  - Extended research stay in [Rajesh Ranganath's](#) group at CILVR.
  - Researching the theory of generative models including Diffusion Models, Continuous Normalising Flows and Stochastic interpolants.
- **Research Scientist Intern** at [Sony AI](#), Tokyo (June '24- Oct '24)
  - Worked with the Deep Generative Modelling team on disentanglement and controllable generation in Latent Diffusion Models. Manuscript under peer review.
  - Investigations included study of generative models like GANs, continuous normalising flows and non-linear diffusion models.
- **Project Associate** at [RBCDSAI](#), IIT Madras (Aug '20 - Feb '21)
  - Obtaining global rankings for a set of participants given noisy pairwise preferences drawing from works in Spectral Ranking, Matrix completion theory and going beyond the Bradley-Terry-Luce model.
  - Probability theory, Linear Algebra and Markovian theory. (Pytorch, Kubernetes)
- **Research Intern**, [Approximate Bayesian Inference team](#) at RIKEN-AIP, Tokyo (June '19 - Dec '19)
  - Scaling Natural Gradient Variational Inference for [Mixture of Exponential family approximations](#).
  - Approximating Deep Neural Networks with Gaussian Processes and [applications of acquired Marginal Likelihood](#).
  - Pruning Bayesian Neural Networks using learned posterior approximations from [Natural Gradient Variational Inference](#).
- **Summer Intern, Machine learning** at [Turtle Shell Technologies](#), Bengaluru (June '17 - July '17)
  - K-means clustering and PCA applied to Bio-Medical Signals captured via sensors.
  - Optimizing implementation and increasing the accuracy of the results by modifying the code for cluster formation.

## SELECTED PUBLICATIONS

- Bounded Implicit Variational Inference  
Anshuk Uppal, Wouter Boomsma & Jes Frellsen [ICML 2022 workshop on Distribution free Uncertainty Quantification].
- Implicit Variational Inference for High-Dimensional Posteriors ([arxiv](#))  
Anshuk Uppal, Kristoffer Stensbo-Smidt, Wouter Boomsma & Jes Frellsen [NeurIPS 2023 [Spotlight](#)]

## TEACHING

- Deep Learning for Industry, special course at Technical University of Denmark, December 2021
- Deep Learning, 02456 at Technical University of Denmark, Fall semester 2022

- Deep Learning, 02456 at Technical University of Denmark, Fall semester 2023
- Generative modelling Summer School, Copenhagen 2023 [Teaching Support & organisation]

## GRANTS AWARDED

- Otto Mønsted's travel grant - NeurIPS 2023
- Otto Mønsted's external visit grant - October 2024 to April 2025
- Thomas B Thrige's external visit grant - October 2024 to April 2025
- William DeMant external visit grant - October 2025 to April 2025

## TOPICS OF INTEREST

- Deep generative modelling, approximate inference & uncertainty quantification
- Natural gradients, higher-order optimisation & gradient estimation
- Applications of Bayesian methods to life sciences
- High-dimensional geometry & measure theory

## PROGRAMMING LANGUAGES

- **Languages:** Python, C & BASH
- **ML Packages & PPLs:** PyTorch, JAX, Pyro & NumPyro
- **Nostalgic about:** Octave, MATLAB, GNU Sim8085, Simulink, C++, OpenCV & Chainer

## ML Projects (masters')

- **Estimating multimodal posteriors using natural gradients** (Master's Project, Fall '19)  
Prof G Srinivasaraghavan
  - Exploring recently proposed fast natural gradient variational inference algorithms ([VADAM](#), [VOGN](#)) and deeply analysing the parameters updates which utilized natural gradients.
  - Reformulating [parameter updates for Gaussian mixture model](#) to improve sampling efficiency. The ideas were centred around distributed training strategies.
  - Incorporating control variates devised by collaborators from Prowler (now [Secondmind](#)) to reduce gradient variance.
  - Dissertation submitted in July '20 ([draft](#))
- **Spatial reasoning in VQA** (Project Elective, Summer '18)  
Prof Dinesh Babu J
  - Generating spatial positions of objects relative to other objects in the environment in nuance language when presented with a question in the same language.
  - Proper nouns in question presented are used to drive attention in the image ([inspired](#)). This requires a good correlation between features picked up from word embedding and ones learnt from the image.
  - Given input image is parsed by the network in a row by row or column by column fashion in order to create history of previous parses and relate current parsing with accumulated history (essentially locations of objects). Accomplished using [Temporal Convolutional Networks](#).