

Anshuk Uppal

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ACADEMIC DETAILS

Education	Institute/School	Year	CGPA/%
PhD candidate	DTU Compute(CogSys)	Current	-
Integrated MTech. in ECE	IIT Bangalore, India	2020	3.3/4.0
12th Board(CBSE)	Indore Public School(Indore,M.P.)	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.
- **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.

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

SUMMER SCHOOLS

- Human in the loop and Learning With Limited Labels, Technical University of Denmark 2022
- Generative modelling Summer School, Copenhagen 2023 [Teaching Support & organisation]

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:** C, Python & BASH
- **ML Packages & PPLs:** PyTorch, JAX, Pyro, NumPyro
- **Nostalgic about:** Octave, MATLAB, GNUOctave & 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](#).
- **Convolutional NNs in Numpy** (Neural Networks and Reinforcement learning)
Prof G Srinivas Raghavan
 - Implementing all steps of forward and backward propagation of CNNs in [NumPy](#).
 - For optimal performance there were no [loops](#). All of the operations were carried out in [vectorized](#) manner using [fromfunction](#) from NumPy package.
 - Some network configurations were tested out on a popular data set - [MNIST](#) which converged to an optima ratifying the functioning.