

# Aniket Das

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UNDERGRADUATE, ELECTRICAL ENGINEERING AND COMPUTER SCIENCE AND ENGINEERING, IIT KANPUR

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## EDUCATION

**Indian Institute of Technology Kanpur, India**  
*Double Major in Electrical Engineering and  
Computer Science and Engineering*  
**GPA: 9.1/10** (5 Semesters)

*Aug' 17 - Jun' 21 (Expected)*

**Aalto University, Finland**  
*Exchange Semester in Department of Computer Science*

*Jan' 20 - May' 20*

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## RESEARCH INTERESTS

Approximate Inference, ODE and SDE-based Models in ML, Riemannian Methods in ML, Gradient Based MCMC, Natural Gradient VI, Particle VI, Representation Learning, Deep Generative Models

## PUBLICATIONS

Yatin Dandi, **Aniket Das**, Soumye Singhal, Vinay P. Namboodiri, Piyush Rai “Jointly Trained Image and Video Generation using Residual Vectors” *Winter Conference on Applications of Computer Vision (WACV'20)* [Paper]

Avik Pal\*, **Aniket Das\*** “TorchGAN: A Flexible Framework for GAN Training and Evaluation” *Journal of Machine Learning Research : Machine Learning Open Source Software (JMLR MLOSS)* [Under Review] [Preprint]

*\* indicates equal contribution*

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## WORK EXPERIENCE

**Research Assistant, Aalto University**

*Prof. Harri Lahdesmaki and Prof. Jaakko Lehtinen*

*Jan '19 - Present*

- Supervised by *Dr. Markus Heinonen* (Finnish Center for AI and Aalto University), *Prof. Harri Lahdesmaki* (Aalto University) and *Prof. Jaakko Lehtinen* (NVIDIA Research, Finnish Center for AI and Aalto University)
  - Working on the development of continuous time probabilistic models, approximate inference and adversarial learning algorithms governed by Ordinary and Stochastic Differential Equations.
  - Particular focus on developing continuous time probabilistic models for high dimensional time series
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## SELECTED PROJECTS

**Probabilistic Models for Joint Image and Video Generation**

*Prof. Piyush Rai and Prof. Vinay P. Namboodiri, IIT Kanpur: [Paper] Mar '19 - July '19*

- Investigated several models for video generation, forecasting and representation learning, with particular focus on video generation models and models that disentangle content and motion
- Developed a hierarchical model for joint image and video generation that generates a summary frame for the video, and models individual frames by adding residual vectors to the summary frame representation at each timestep.
- Developed an analogous hierarchy for models that disentangle content from motion, by adding to the base content representation, a residual content vector at every timestep
- Implemented proposed models for both VAEs and GANs. Performed human evaluation on Amazon MTurk and observed significant improvements in both image and video generation
- Paper accepted at the *Winter Conference on Applications of Computer Vision (WACV) 2020*. Currently working on generalising the image latent space interpolation to datasets of rotated objects

## TorchGAN: A Flexible Framework for GAN Training and Evaluation

Independent Open Source Project : [\[Code\]](#) [\[Docs\]](#) [\[Preprint\]](#)

Dec'18 - Sep'19

- Developed a lightweight customizable PyTorch framework for training and evaluation of GANs
- Wrote efficient implementations of various GAN models, losses, evaluation metrics and stability enhancement features and designed a customizable framework for effortlessly extending them
- Project hosted on Github has over 800 stars. Paper is currently submitted to the *Journal of Machine Learning Research: Machine Learning Open Source Software (JMLR MLOSS)*

## ONGOING PROJECTS

### Particle VI and Riemannian Methods in ML

Prof. Piyush Rai, IIT Kanpur

Sept. '19 - Present

- Exploring avenues such as Riemannian MCMC Algorithms and their underlying Diffusion Processes, Particle VI algorithms such as Stein VI and their analysis as Wasserstein Gradient Flows
- Investigating approaches for combining Particle VI with Natural Gradient Flow for the development of Particle VI analogues of scalable Natural Gradient VI algorithms such as VAdam and VProp

## SKILLS

**Languages:** *Proficient:* Python, C, C++ *Familiar:* Julia, Octave, Javascript  
**Deep Learning Frameworks:** Pytorch, Tensorflow, Flux.jl  
**Data Science Libraries:** NumPy, Pandas, Pillow, Scipy, Scikit-Learn, Gensim  
**Utilities:** Linux Shell, Git, Vim, Docker, L<sup>A</sup>T<sub>E</sub>X, Amazon AWS, Amazon Mechanical Turk

## RELEVANT COURSEWORK

Introduction to Programming <b>A*</b>	Data Structures and Algorithms <b>A</b>
Linear Algebra & ODE <b>A</b>	Real Analysis and Multivariate Calculus <b>A</b>
Partial Differential Equations <b>A</b>	Complex Analysis <b>A</b>
Signals and Systems <b>A</b>	Probability and Statistics <b>A</b>
Topics in Probabilistic Modelling and Inference <b>A</b>	Statistical Signal Processing <b>A*</b>
Machine Learning for Signal Processing <b>A</b>	Convex Optimization <i>a</i>
Advanced Probabilistic ML <b>@</b>	Optimization in ML <b>@</b>
Kernel Methods and Learning Theory <b>@</b>	Dynamical Systems and Chaos <b>@</b>
State Space Models <b>@</b>	Computational Number Theory <b>@</b>

**A\*:** Exceptional Performance (Top 1%)    *i*: In progress    *a*: Audit  
**@** Course at Aalto University

## MENTORSHIP ROLES

### Project Mentor, Exploring Probabilistic Machine Learning

Programming Club, IIT Kanpur

May. '19 - July '19

- Mentored a group of fourteen freshmen on Probabilistic Machine Learning and its applications
- Conducted lectures, authored weekly assignments and mentored projects on Bayesian Matrix Factorization, Black Box VI and Auto Encoding VB, Stepwise and Incremental EM, and SVI

### Project Mentor, Exploring Generative Adversarial Networks

Association of Computing Activities, IIT Kanpur

Mar. '19 - May. '19

- Mentored a group of eight freshmen on Deep Generative Models and Generative Adversarial Networks
- Conducted lectures and designed assignments for implementing GAN models, losses and metrics

### Coordinator, Special Interest Group in Machine Learning

IIT Kanpur

Sept. '19 - Present

- One of the four Coordinators of the SIGML, the Institute forum for student researchers in ML
- Responsible for delivering and conducting talks on current research and special topics in ML