Adrish Dey

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Research Interests

Geometric and Topological Deep Learning, Optimal Transport, Topological Data Analysis, Generative Models, Implicit Neural Networks. Widely, I am interested in explaining problems arising in machine learning, statistics, geometry processing and computer vision with differential geometry and topology.

Education

Netaji Subhash Engineering College – ***GPA 8.1 / 10.0*** 07/2017 - 07/2021

Bachelor in Technology (B.Tech) in Computer Science and Engineering.

Experiences

Weights & Biases 11/2021 - present

Machine Learning Engineer – Growth Team

Massachusetts Institute of Technology 07/2021 - 08/2021

Summer Geometry Institute (SGI) Research Fellow

1. Implemented an OpenFlipper extension for optimizing folded-over quad-meshes via locally injective maps (with Prof. David Bommes, University of Bern)
2. Explored continuous label switching in Bayesian Rotation Synchronization Problem (with David R. Palmer, MIT)
3. Implemented proof-of-concept experiments for a novel riemannian gradient descent based approach to alleviate continuous label switching (with David R. Palmer, MIT) [Link to Report]
4. Exploring Anisotropic Schrödinger Bridges on discrete manifolds. (with Prof. Justin Solomon, MIT)

Bachelor's Thesis 04/2021 - 07/2021

Title: "Discrete Non-Euclidean Convolutions: Signal Processing and Random Walk on Simplicial Complexes"
Advisors: Dr. Bastian Alexander Rieck (ETH Zürich, currently Technische Universität München, Germany); Prof. Silpi Bose (Netaji Subhash Engineering College, Kolkata)
Contributions: Explored a novel method for defining simplicial diffusion convolution neural networks.

Independent Research 08/2020 - 10/2020

Mentored By: Dr. Bastian Alexander Rieck, ETH Zürich

1. Studied Disconnected Manifold Learning in GANs, using Persistent Homology.
2. Implemented Experiments and co-authored a NeurIPS Workshop Submission. [Link to Report]

Opaltech.ai 05/2020 - 08/2020

Research Engineering Intern

1. Explored and Implemented a RGBD SLAM based 3D Scene Reconstruction Framework with Dr. Shahrouz Ryan Alimo, NASA Jet Propulsion Lab

2. Implemented a Raytracing based Simulator for synthetic data generation

Rephrase.ai 12/2019 - 02/2020
Research Intern

1. Designed a data pre-processing unit, for stream lining audio-splitting / filter-bank generation.
2. Explored and implemented a sparsity-optimized version of a hessian-free second-order optimizer.
3. Contributed to Generative Adversarial Network (GAN) driven domain translation of face expressions.

Google 05/2019 - 08/2019
Google Summer of Code Student – TensorFlow

1. Implemented Enhanced Super Resolution Generative Adversarial Network (ESRGAN) and published the trained model to TensorFlow Hub.
   [Link to Github]
   [Link to Pretrained Model] ($2K+$ **downloads**)
2. Implemented GAN Distillation Framework for ESRGAN generator. Achieved $\sim$ **628x compression factor** with minimal drop in reconstruction quality. Capable of running **near-real-time** video frame super resolution on Pixel 3 CPU. [Link to Github]
3. Added Support for displaying AutoGraphed tf.functions, with TensorFlow `saved_model_cli`. [Link to Github]

Conference Publications

Topo Sampler: A Topology Constrained Noise Sampling for GANs
Adrish Dey, Sayantan Das
Neural Information Processing Systems (NeurIPS) 2020 – Workshop on Topological Data Analysis and Beyond. **Spotlight presentation**

Service

Reviewer: ICLR 2021 Workshop on Geometry and Topology in Representation Learning.