ROHAN V KASHYAP

Indian Institute of Science, Bangalore

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EDUCATION

Bangalore Institute of Technology   **August 2016 – August 2020**

Bachelor of Engineering in Electronics and Communication Engineering   GPA: 8.81/10 / Rank: 5 /180

Advisor: Dr. Narendra C.P. Research Thesis: Gaussian Process and Neural Networks using limit theorems.

PUBLICATIONS

Pavan S.K.*, **Rohan V Kashyap***, Prathosh A.P. Neural discovery of permutation subgroups. Artificial Intelligence and Statistics (AISTATS) 2023.   [Paper]

Pavan S.K.*, **Rohan V Kashyap***, Prathosh A.P, Aditya Gopalan. A Unified Framework for Discovering Discrete Symmetries. Artificial Intelligence and Statistics (AISTATS) 2024 (positive reviewer scores: **3**/5, **3**/5, **3**/5, **3**/5).   [Paper]

Rohan V Kashyap. A Survey of Deep Learning Optimizers – First and Second Order Methods. IEEE Transactions on Neural Networks and Learning Systems (under review).   [Paper]

Rohan V Kashyap*, Vivek V Kashyap, Narendra C.P. GPT–Neo for Commonsense Reasoning - a Theoretical and Practical lens. ACM Transactions on Audio, Speech and Language Processing (under review).   [Paper]

EXPERIENCE

Indian Institute of Science   **Bangalore, India**

Research Assistant, Deep Representation Learning Lab, Advisor: Dr. Prathosh A.P.   *Jan 2022 – Present*

- Designed and implemented novel methodologies to incorporate invariance symmetries into neural networks. We demonstrated strong theoretical results for discovering permutation, cyclic and dihedral groups when the underlying group is unknown using linear maps; **published** at AISTATS 2023.
- Proposed a unified architecture for automatic symmetry discovery of discrete groups using tensor-valued functions in a multi-armed bandit setting. We devised a theoretical framework to handle invariance symmetries for a generic class of permutation subgroups and non-isomorphic product groups with 98% accuracy; **under review** at AISTATS 2024.
- Conducted research on the analysis of orbit separation of group symmetries using invariant polynomial rings and devised a novel methodology to learn matrix lie groups using their corresponding lie subalgebras via the exponential map; **to be submitted** to ICML 2024.
- Working on single-step dataset condensation methods (1-example per-class) using diffusion-based models. We demonstrated high-resolution sample generation (512*512) using the probability-flow ODE trajectories and the consistency distillation objective on the ImageNet, CIFAR-10 and LSUN datasets.

Gupshup   **Bangalore, India**

Machine Learning Engineer   *Jan 2021 – Dec 2021*

- Migrated workflows to AWS SageMaker Studio for Transformer-based models (BERT, GPT-2) using large-scale EC2 servers for data processing, model training, batch predictions on GPU's and deployed model endpoints using AWS lambda.
- Implemented GraphSAGE graph neural networks (GNN) using the Deep Graph Library (DGL) and PyTorch for handling prompt queries and aggregating relevant semantic parsers from web crawls with a recall @3 (R@3) of 0.223.
- Designed and evaluated sparse attention-based Transformer models (Reformer) for adaptive transfer learning on question-answering, autocompletion and later devised a model distillation procedure with a 22.3% increase in model perplexity.

Needl.AI   **Bangalore, India**

Research Intern, Advisor: Vikram Srinivasan   *Mar 2020 – Nov 2020*

- Worked on BERT model optimization for reduced latency and accelerated inference on GPU's using adaptive model pruning and knowledge distillation to obtain a 5x smaller model size for numerous NLP tasks with 94% accuracy.
- Investigated meta-learning and unsupervised domain adaptation of language models (LMs) using a plug-and-play cross-lingual decoder model for efficient feature-transfer using custom financial dataset on downstream tasks.

Honeywell   **Bangalore, India**

Research Intern   *July 2019 – Aug 2019*

- Implemented the facial recognition task using GANs which was successfully integrated into the product pipeline.

TEACHING EXPERIENCE

- Provided office hours, designed and graded assignments and quizzes for 3 consecutive semesters for the following graduate- level courses: Advanced Deep Representation Learning (Fall 2022, Fall 2023 (current); Dr. Prathosh A.P.) and Pattern Recognition and Neural Networks (Spring 2023; Dr. Prathosh A.P.).

ACHIEVEMENTS

- First student in the VTU University to secure 100/100 in Signals and Systems (Fourth Semester).
- Selected for Google's TensorFlow Dev Summit at Sunnyvale, California (2020).
- Selected for AI Summer School Workshop at IIT Madras Research Park (2019).
- Served as a sub-reviewer for NeurIPS 2023 and AISTATS 2024 conferences under Prof. Prathosh A.P.
- Served as a volunteer for SPCOM 2022 conference held at Indian Institute of Science, India.
- Selected for the AIS – Lie groups and Lie algebras 2023 workshop conducted in the Department of Mathematics, Indian Institute of Science (IISc), India.

RESEARCH PROJECTS

Group Equivariance for Matrix Lie groups / *Advisor: Dr. Prathosh A.P, Dr. Aditya Gopalan*
- Implemented Group Equivariant neural network for discovering connected lie groups using the Lie derivatives and their correspondence with the finite-dimensional representations of the lie subalgebra.
- Examined the L-conv and LieGAN architectures for model implementation and obtained interpretable lie algebra basis representations for SO(n), SO(1, 3)+, O(n) and the affine group. Currently working on extending our analysis for non-compact groups using localized kernels.

Generalized Flow-based models / *Advisor: Dr. Prathosh A.P.*
- Examined continuous normalizing flows (CNF) and diffusion-based models for supervised training using generalized probability path trajectories to study its influence on the number of inference steps against sample-quality for image generation tasks.
- Investigated the sampling path trajectories of the score function for these models using a gaussian source distribution in both the class-conditional and unconditional setting with an FID of 6.72 on the ImageNet (32*32) dataset.

TECHNICAL SKILLS

- **Languages**: Python, C++
- **Libraries**: Pytorch, Tensorflow, Scikit-learn
- **Software**: Git, Docker, AWS Cloud
- **IISc Coursework**: Probability Theory (MA 361), Real Analysis (MA 221), Abstract Algebra (MA 212), Differential Manifolds (MA 235), Advanced Deep Representation Learning (E1-285), Design and Analysis of Algorithms (E0 225), Online Learning and Prediction (E1-245)

BLOGS

- Group Equivariance for Matrix Lie groups.   [Article]
- Score-based generative modeling.   [Article]