Curriculum Vitae

Sourya Basu

Ph.D. Candidate
Advisor: Prof. Lav Varshney
Electrical & Computer Engineering, UIUC
Geometric deep learning | NLP | Information theory

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Education

2018 - present	MS-PhD in ECE	University of Illinois, Urbana-Champaign	GPA - 3.96/4.0
2013 - 2017	BTech in EE	Indian Institute of Technology, Kanpur	GPA - 9.6/10.0

Selected Publications

S. Basu, G. S. Ramachandran, N. S. Keskar, and L. R. Varshney, **"Mirostat: A Neural Text Decoding Algorithm that Directly Controls Perplexity,"** in Proceedings of the 9th International Conference on Learning Representations (**ICLR**), [Vienna, Austria], 4-8 May 2021. [Paper | Blog | Code]

S. Basu, D. Seo, and L. R. Varshney, **"Hypergraph-based Coding Schemes for Two Source Coding Problems under Maximal Distortion,"** in *Proceedings of the 2020 IEEE International Symposium on Information Theory* (**ISIT**), [Los Angeles, California], 21-26 June 2020. [Paper]

S. Basu, D. Seo, and L. R. Varshney, **"Functional Epsilon Entropy,"** in *Proceedings of the IEEE Data Compression Conference* (**DCC**), [Snowbird, Utah], 24-27 March 2020. [Paper]

S. Basu and L. R. Varshney, **"Universal Source Coding of Deep Neural Networks,"** in *Proceedings of the IEEE Data Compression Conference* (**DCC**), [Snowbird, Utah], 4-7 April 2017. [Paper]

Work experience

Research Assistant, Coordinated Science Lab, UIUC — 2018-present

Information theory and applications in NLP — Prof. Lav Varshney

- Developed new coding schemes for information-theoretic data compression problems, published in **DCC'20**, **ISIT'20**.
- With **Salesforce Research**, developed an information-theoretic text decoding algorithm for large NLP models like GPT-2 that generates high-quality texts with controlled repetitions, which was published in **ICLR'21**.

Geometric deep learning — Prof. Lav Varshney (ongoing)

- Gauge equivariant policy learning and evaluation methods for reinforcement learning on 2D manifolds.
- Gauge equivariant vector quantization techniques for fields on manifolds for weather data generation.

Selected projects

Gauge Equivariant Mesh Attention Networks — Dr. Taco Cohen, Qualcomm AI Research (ongoing)

- Anisotropic attention mechanism for data signals stored on meshes that is equivariant to local changes in gauge.

Platonic CNNs — Dr. Taco Cohen, Qualcomm AI Research (ongoing)

- Implemented gauge equivariant convolutional networks for data signals stored on cubes.
- Concepts were taken from Gauge-CNNs. This work was part of the LogML workshop. Code to be released soon.

Technical Skills

Python, Pytorch, Pytorch-geometric, Pytorch-lightning, Numpy, Matlab, GitHub

Graduate coursework

Machine Learning: Pattern Recognition, Statistical Learning Theory, Statistical Reinforcement Learning
Mathematics: Introduction to Abstract Algebra, Concentration Inequalities and Stein's Method, Convex Optimization
Information Theory: Random Processes, Information Theory, Detection and Estimation Theory, Coding Theory

Teaching and service

- Teaching assistant: ECE 563 Information Theory (Fall 2020)
- Reviewer: IEEE Transactions on Signal Processing, ITW 2021, ICLR 2021 Neural Compression Workshop, ISIT 2020

Awards and Achievements

- **Dr. Ok Kyun Kim Fellow** (2021-2022), **ECE Distinguished Research Fellow** (2019-2022), **James M. Henderson Fellow** (2019-2020), **Dilip and Sandhya Sarwate Graduate Fellow** (2018-2019) at UIUC.
- **Academic Excellence Award** at IIT Kanpur for distinctive academic performance for the years **2013-14**, **2014-15**, **2015-16**.
- Ranked amongst the **top 10** teams across all the IITs in **Ericsson Innovation Award 2014-2015**.
- **All India Rank 181** in **JEE ADVANCED 2013** out of 0.15 million students.
- Kishore Vaigyanik Protsahan Yojna (**KVPY**) Scholar, awarded to top 600 students in India.
- **Certificate of Merit** for **National Standard Examination in Physics, Chemistry, Astronomy** (2012-2013).