SUROJIT SAHA

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EDUCATION

Ph.D. in Computer Science, ***Kahlert School of Computing, The University of Utah, USA*** 2018 – 2024
Research areas**:** Machine Learning and Computer Vision, ***Advisor*****:** Dr. Ross Whitaker **3.98/4.0**

Master of Technology in Computer Science, ***Homi Bhabha National Institute, India*** 2009 – 2012
Research area**:** Autonomous Navigation of Mobile Robots, ***Advisor*****:** Dr. Prabir Kumar Pal **80.3/100**

Bachelor of Technology in Computer Science, ***Maulana Abul Kalam Azad University of Technology, India*** 2005 – 2009
Research area**:** Database Management Systems, ***Advisor*****:** Dr. Arup Kumar Bhaumik **9.08/10**

Research Interests: VAEs, GANs, Diffusion Models, Transformers, Few-Shot Learning, Self-Supervised Learning, Unsupervised Learning, Bayesian Statistics, Computer Vision, and Natural Language Processing.
Skills: TensorFlow, PyTorch, Python, C, C++, MATLAB.

PROJECTS

Generative Encoding Networks (*GENs*)

- Use *kernel density estimate* (KDE) to match the aggregate posterior distribution.
- Encourage *statistical analysis* using the properties of the latent distribution at convergence.
- Outperform the SOTA *outlier detection* methods.

Aggregate Variational Autoencoders (*AVAEs*)

- Alleviate the *posterior collapse* and *holes* encountered in the VAE.
- Use KDE in high-dimensional latent spaces (dimensions > 100).
- Discover *disentangled* latent factors that are more interpretable than other variants of VAEs.

Automatic Relevancy Detection in the Variational Autoencoder (*ARD-VAE*)

- Discovers *relevant* axes in the VAE using a *hierarchical* prior (using Bayesian statistics).
- *Robust* to the choice of the autoencoder architectures and optimization strategies.
- More effective in *modeling data distributions* and finding *latent factors explaining the data*.

Few-Shot Segmentation (FSS) Methods Using Gaussian Processes (a Bayesian modeling framework)

- Developed an FSS method for interpreting microscopy images, named the ***GP-UNet***.
- Proposed an FSS method that can adapt to the *varying number of classes*, dubbed the ***AdaSemSeg***.

Multitask Learning

- Proposed a multitask learning method for regularizing deep neural networks.
- Demonstrated its effectiveness in training models with *limited* labeled data.

3D Computer Vision

- Proposed an alternative to pairwise *3D scan registration*.
- Designed computationally efficient solvers for joint estimation of the camera poses in small loops.

PROFESSIONAL EXPERIENCE

Graduate Research Assistant, **The University of Utah**, ***Advisor*****:** Dr. Ross Whitaker Jan 2019 – Present
Developed multiple DLVMs with provable properties of the latent space that find application in several downstream tasks.

CV/NLP PhD Intern, **Ancestry.com**, ***Mentor***: Dr. Jack Reese May 2021 – Aug 2021
Developed regularization techniques for detecting paragraphs, tables, and other data layouts related to the ***Family History Book***.

Graduate Assistant, **The University of Utah**, ***Mentor*****:** Dr. Srikumar Ramalingam Aug 2018 – Dec 2018
Developed a 3D scan registration method that jointly estimates the poses of multiple cameras using efficient solvers.

Scientific Officer, **Department of Atomic Energy, Government of India** Sept 2009 – Aug 2018
Developed accurate, robust, and efficient localization algorithms for indoor mobile robots based on the principle of Monte Carlo.

PUBLICATIONS

1. Surojit Saha, Sarang Joshi, and Ross Whitaker**,** *ARD-VAE: A Statistical Formulation to Find the Relevant Latent Dimensions of Variational Autoencoders*, 2024 (under review).

2. Surojit Saha, and Ross Whitaker**,** *AdaSemSeg: An Adaptive Few-shot Semantic Segmentation of Seismic Facies*, 2024 (under review).

3. Surojit Saha, Sarang Joshi, and Ross Whitaker**,** *Matching Aggregate Posteriors in the Variational Autoencoder*, International Conference on Pattern Recognition (accepted), 2024.

4. Surojit Saha*, Wasim Gazi*, Rehman Mohammed, Thomas Rapstine, Hayden Powers, and Ross Whitaker, *Multi-task Training as Regularization Strategy for Seismic Image Segmentation*, IEEE Geoscience and Remote Sensing Letters (**IF: 4.8**), 2023.

5. Xiwen Li, Tristalee Mangin, **Surojit Saha**, Rehman Mohammed, Evan Blanchard, Dillon Tang, Henry Poppe, Nathan Searle, Ouk Choi, Kerry Kelly, and Ross Whitaker, *Real-Time Idling Vehicles Detection Using Combined Audio-Visual Deep Learning,* International Conference on Intelligent Traffic and Transportation, 2023.

6. Surojit Saha, Shireen Elhabian, and Ross Whitaker**,** *GENs: Generative Encoding Networks*, Machine Learning (**IF: 7.5**), 2022.

7. Surojit Saha, Ouk Choi, and Ross Whitaker, *Few-Shot Segmentation of Microscopy Images Using Gaussian Process*, a MICCAI workshop on Medical Optical Imaging and Virtual Microscopy Image Analysis, 2022.

8. Pedro Miraldo, **Surojit Saha** and Srikumar Ramalingam, *Minimal Solvers for Mini-Loop Closures in 3D Multi-Scan Alignment*, IEEE/CVF Conference on Computer Vision and Pattern Recognition, 2019.

ACHIEVEMENTS

1. Best paper award at MICCAI workshop on Medical Optical Imaging and Virtual Microscopy Image Analysis, 2022.
2. 99.16 percentile in GATE-2009, India (countrywide exam for pursuing Master of Technology).

SERVICES

Conferences: Served as a reviewer for the AAAI-23, ACML-23, AAAI-22, and ICVGIP-21.
Journals: Served as a reviewer for the IEEE TPAMI and IEEE TGRS.

TEACHING

1. *Teaching Mentor* for **Deep Learning**, Fall 2019, *Kahlert School of Computing, The University of Utah, USA*.
2. *Teaching Mentor* for **3D Computer Vision**, Spring 2020, *Kahlert School of Computing, The University of Utah, USA*.
3. *Delivered a tutorial on PyTorch* in **Image Processing**, Fall 2023, *Kahlert School of Computing, The University of Utah, USA*.
4. *Delivered a lecture on Introduction to Statistics* in **Probability and Statistics for Engineers**, Spring 2024, *Kahlert School of Computing, The University of Utah, USA*.