Soumen Basu

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Education

PhD in Computer Science
Indian Institute of Technology Delhi (2019 – 2024)
- **Area:** Computer Vision, Deep Learning, Medical Image Analysis
- **Thesis:** Deep Learning Models for Detecting Gallbladder Cancer from Ultrasound
- Pioneered the AI-based Gallbladder Cancer (GBC) detection model from Ultrasound (US).
- Published original research in international venues such as **CVPR, MICCAI, Medical Image Analysis, and Lancet Regional Health**.
- Highly prestigious **Prime Minister's Research Fellow** (awarded to top 3.5% of PhDs from top-10 national institutes in India)
- Recognized with the Outstanding Teaching Assistant Award for the Machine Learning course.

M. Tech in Computer Science
Indian Institute of Technology Delhi (2013 – 2015)
- Achieved All India Rank 99 out of 224,160 candidates in GATE 2013 (Computer Science)

Publications

[1] **S. Basu**, M. Gupta, P. Rana, P. Gupta, C. Arora. "Surpassing the Human Accuracy: Detecting Gallbladder Cancer from USG with Curriculum Learning", **CVPR** 2022. https://arxiv.org/abs/2204.11433

[2] **S. Basu**, S. Singla, M. Gupta, P. Rana, P. Gupta, C. Arora. "Unsupervised Contrastive Learning of Image Representations from Ultrasound Videos with Hard Negative Mining", **MICCAI** 2022. https://arxiv.org/abs/2207.13148

[3] **S. Basu**, M. Gupta, P. Rana, P. Gupta, C. Arora. "RadFormer: Transformers with global–local attention for interpretable and accurate Gallbladder Cancer detection", Elsevier **Medical Image Analysis** (IF: 13.828) 2023. https://arxiv.org/abs/2211.04793

[4] **S. Basu**, A. Papanai, M. Gupta, P. Gupta, C. Arora. "Gall Bladder Cancer Detection from US Images with Only Image Level Labels", **MICCAI** 2023. https://arxiv.org/abs/2309.05261

[5] M. Gupta, **S. Basu**, C. Arora. "How reliable are the metrics used for assessing reliability in medical imaging?", **MICCAI** 2023 (Oral Paper). https://link.springer.com/chapter/10.1007/978-3-031-43898-1_15

[6] P. Gupta, **S. Basu**, et al. "Deep-learning enabled ultrasound based accurate detection of gallbladder cancer: A prospective diagnostic study", The **LANCET Regional Health** South East Asia 2023. https://www.thelancet.com/journals/lansea/article/PIIS2772-3682(23)00139-7/

[7] P. Gupta, **S. Basu**, et al. "Deep learning models for differentiation of xanthogranulomatous cholecystitis and gallbladder cancer on ultrasound", Springer, **Indian Journal of Gastroenterology** (IF: 2.0) 2023. https://link.springer.com/article/10.1007/s12664-023-01483-0

[8] P. Gupta, **S. Basu**, C. Arora. "Applications of artificial intelligence in biliary tract cancers", Springer, **Indian Journal of Gastroenterology** (IF: 2.0) 2024. https://link.springer.com/article/10.1007/s12664-024-01518-0

[9] **S. Basu**, M. Gupta, C. Madan, P. Gupta, C. Arora. "FocusMAE: Gallbladder Cancer Detection from Ultrasound Videos with Focused Masked Autoencoders", **CVPR** 2024. https://arxiv.org/abs/2403.08848

Areas of Interest

- Computer Vision, Machine Learning, Deep Learning, Medical Image Analysis, Image or Video Processing,
- Data-efficient Learning, Un-supervised/ Weakly-supervised/ Self-supervised Learning, Contrastive Learning, Explainable AI

Work Experience

Senior Chief Engineer (Staff Engineer)
Samsung Research Bangalore (03/2024 – Current)
- Area: Computer Vision, Machine Learning
- Conducting research on foundational video and image-based segmentation/ detection models.
- Won the Samsung *Mobile Developer Congress (MDC)* funding for Foundational Segmentation proposal
- Submitted 1 patent application on achieving temporally stable person segmentation within videos

Applied Scientist Intern
Amazon Inc. (07/2023 – 12/2023)
- Area: Computer Vision, Machine Learning
- Developed an ML model for detecting stray objects in conveyor belts, optimizing production.
  Saved $120,000/ year in license costs with an in-house model.
- Developed another model to predict machine breakdown events from sensor data.
  Achieved 21% better precision over the currently deployed model on back-testing.

Research Assistant
Penn State University (08/2018 – 05/2019)
- Designed an optimization framework to reduce operational costs by 18-40% for geo-distributed key-value storage over the public cloud.

Member of Technical Staff
Adobe Systems (07/2015 – 07/2018)
- Developed backend REST APIs for data pipeline on digital ad entities on Terabyte scale.
- Improved the scaling of automatic syncing, and CRUD operations of search engine ad data to production DB.

Grants and Awards

- Prime Minister's Research Fellowship (2021-2023) – Award value – Stipend: INR 22,00,000 and Travel: INR 5,00,000
- Selection for Oral Presentation at MICCAI 2023 (only 3% of the submitted papers)
- Outstanding Teaching Assistant Award for Machine Learning course (2023)
- MICCAI Student Travel Award (2022) – first authors of highest quality papers. Award value: $1000
- CVPR DEI Travel Grant (2022) – award value $600.
- Winner (2nd) of Object Detection Challenge, ICVGIP 2020

Leadership Skills

- **Mentoring and Collaboration:** Mentored 2 Undergrads, 1 Masters student, and 3 RAs to became successful co-authors in CVPR 2022, MICCAI 2022, MICCAI 2023, and CVPR 2024. Delivered high quality publications in the mentioned venues.

- **Management and Leadership:** Led a team of 6 Teaching Assistants to manage the Machine Learning course with 150 students. Successfully assigned duties, coordinated tutorial sessions and examinations, and received the Outstanding TA award for exceptional leadership.

- **Teamwork and Organization:** Organized a remote and cross-functional team involving doctors and engineers for doctoral research. Currently working with a team geographically distributed across NA, EU, and APAC at Amazon.

- **Resource Management:** Managed lab resources for the group containing 17 graduate and 16 undergraduate/ interns, ensuring efficient utilization and an organized environment for the group.

- **Hiring Talent:** Conducted technical interviews for the recruitment of Interns and Research Assistants, facilitating talent assessment and successful on-boarding of candidates.

Technical Skills

- Python, PyTorch, Keras, OpenCV, Scikit-Learn, Numpy, Pandas
- CUDA, SQL, AWS, Git, REST APIs, Flask

Reviewer Experience

- Served as reviewer in: AAAI 2023, AAAI 2024, CVPR 2023, CVPR 2024, ICCV 2023, IPCAI 2023, WACV 2024, IJCAI 2024, MICCAI 2024, ECCV 2024, Abdominal Radiology, IEEE Multimedia.

Talks

- Talk at Emory University (Dec 2023)
- SciTech Talks Podcast (Jul 2023)
- RME Data Science India Offsite Event, Amazon Inc (Jul 2023)
- PhD Seminar, Department of Computer Science, IIT Delhi (Nov 2022)