# Soumen Basu

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## Profile Summary

PhD in Computer Vision, Machine Learning / Deep Learning. Master's in Computer Science with 3+ years of industry and 5+ years of academic research experience. Looking for Research Scientist/ Leadership positions in cutting edge CV/ ML initiatives.

## Education

**PhD in Computer Science**
**Indian Institute of Technology Delhi** (07/2019 – 01/2024)

- **Area: Computer Vision, Deep Learning**
- Thesis: Deep Learning-based Gallbladder Cancer Detection from Ultrasound
- Received the highly prestigious **Prime Minister's Research Fellowship** (awarded to 3.5% of PhD students from top-10 national institutes in India)
- Pioneered the first AI-based Gallbladder Cancer (GBC) detection model from Ultrasound (US), published at CVPR 2022.
- Innovated accurate, efficient, and explainable models for GBC detection – potential to improve the 5-year survival rate from 5% to 57% with AI-based early detection.
- Published in high-impact international venues like **CVPR, MICCAI, Medical Image Analysis, and Lancet Regional Health**.
- Engineered a cloud application prototype and deployed models on an IoT device (Jetson) for real-time clinical testing in multiple hospitals across India.
- Teaching Assistant for Computer Vision, ML, Data Structure courses. Recognized with the **Outstanding Teaching Assistant Award** for the Machine Learning course.

**M. Tech in Computer Science** (equivalent to an MS)
**Indian Institute of Technology Delhi** (07/2013 – 06/2015)

- Achieved All India Rank 99 out of 224,160 candidates in GATE 2013 (Computer Science)
- Thesis: Randomized Rounding using Random Walks – An Experimental Study

## Areas of Interest

- Computer Vision, Machine Learning, Deep Learning, Medical Image Analysis, Image or Video Processing,
- Un-supervised/ Weakly-supervised/ Self-supervised Learning, Contrastive Learning, Explainable AI
- Transformers, CNN, Foundation Models

## Technical Skills

- Python, PyTorch, OpenCV, Scikit-Learn, Numpy, Pandas
- CUDA, SQL, AWS, Git

## 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.
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.
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.
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
5. M. Gupta, **S. Basu**, C. Arora. "How reliable are the metrics used for assessing reliability in medical imaging?", MICCAI 2023 (Oral Paper)
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.
7. P. Gupta, **S. Basu**, et al. "Deep learning models for differentiation of xanthogranulomatous cholecystitis and gallbladder cancer on ultrasound", Indian Journal of Gastroenterology (Accepted).

## Professional Experience

**Applied Scientist Intern**
**Amazon Inc.** (07/2023 – Present)
- 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.
- Achieved 21% better precision over the currently deployed model on backtesting.
- Developed a model for predicting breakdowns from machine health data – achieved 11% better precision than current model

**Research Assistant**
**Penn State University** (08/2018 – 05/2019)
- Designed an optimization framework to reduce operational costs by 18-40% for geographically 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.

## Leadership Skills

- **Mentoring and Collaboration:** Mentored 2 Undergrads, 1 Masters student, and 3 RAs to became successful co-authors in CVPR 2022, MICCAI 2022, and MICCAI 2023. 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.

## 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

## Reviewer Experience

- Served as reviewer in Computer Vision/ Machine Learning at AAAI 2023, AAAI 2024, CVPR 2023, CVPR 2024, ICCV 2023, WACV 2024, IEEE Transactions of Medical Imaging (IF: 11.03)

## Talks

- Oral Session: Machine Learning II – Towards Transparent AI, MICCAI 2023 (Oct 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)

## Reference

Available on Request