

Hritam Basak

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RESEARCH INTERESTS

Broad interest: Computer Vision, Deep Learning, Medical Image analysis

Specific interest: Annotation-efficient Learning, Image Segmentation, Domain Adaptation, Optimization

EDUCATION

Stony Brook University

Doctor of Philosophy (Ph.D.) in Computer Science | Grade : 3.89/4

Aug. 2022 – Present

New York, USA

Jadavpur University

Bachelor of Engineering in Electrical Engineering | Grade : 8.9/10

Jul. 2017 – May 2021

Kolkata, India

EXPERIENCE

Data Scientist

Jun. 2021 – Jul. 2022

Tata Digital Limited

Mumbai, India

- Engineered a visual search engine for fashion recommendations using RCNN for foreground extraction and pre-trained ResNet for feature extraction, achieving over 96% accuracy.
- Developed an automated human-in-the-loop system to annotate Tata Group's native 20M+ fashion image dataset.
- Designed a promotion recommendation algorithm for 80M customer groups employing Churn and CLTV, and collaborative filtering.

RESEARCH EXPERIENCE

Graduate Research Assistant

Jan. 2023 – Present

Stony Brook University – Advisor: Dr. Zhaozheng Yin

New York, USA

- Summarized medical applications of computer vision encompassing semi-supervised and contrastive representation learning using minimal annotations ($\leq 10\%$).
- Proposed novel pipeline by utilizing pseudo-labels in contrastive learning, which outperformed state-of-the-art methods by $\sim 5\%$ DSC score.
- Published research papers at CVPR 2023, MICCAI 2022 and 2023, ICASSP 2023 with acceptance rates of 24.8%, 13%, 27%, and 42%, respectively.

Research Internship

May 2020 – Aug. 2020

ETH Zurich – Advisor: Dr. Luc Van Gool

Zurich, Switzerland

- Guided a team of 5 undergraduate students to execute cross-image context mining for label-efficient semantic segmentation employing neural co-attention.
- Collaborated on cross-image pixel contrast project to enforce pixel embeddings belonging to the same semantic class to be more similar than embeddings from different classes.
- Composed over 1000 lines in the ContrastiveSeg repository for understanding contextual dependencies among pixels.

Research Internship

Nov. 2019 – Mar. 2020

Sorbonne University – Advisor: Dr. Daniel Racocanu

Paris, France

- Engaged with a team of 2 Postdocs and 3 Ph.D. students, utilizing Deep Learning techniques for clustering and segmentation of densely packed cells.
- Designed a MATLAB toolbox for tracking of NPC cells in culture medium with an accuracy of 93%. Manuscript accepted for publication at SIRS, 2020.
- Coordinated with Paris Brain Institute to analyze the brain activity of human vs. non-human primates with segmentation IoU of 80%.

CURRENT PROJECTS

Domain Adaptation using Generative Latent Search

Jan. 2023 - Present

Stony Brook University

Stony Brook, New York

- Developed a robust and adaptive semi-supervised domain adaptation algorithm for object detection with an adaptation accuracy of 80% for classification on Office-Home.
- Incorporated Gaussian priors for latent space feature alignment followed by latent search, achieving segmentation IoU of 65%. on GTA→CityScapes.

Robust AI system for Multi-modal Medical Image Analysis

Nov. 2022 - Present

Stony Brook University

Stony Brook, New York

- Utilized gaze data to analyze visual attention patterns of expert clinicians on medical images.
- Formulated a novel paradigm that beats existing SoTA by ~7% for image segmentation.

TECHNICAL SKILLS

Languages: Python, MATLAB, Java, C/C++, SQL, JavaScript, HTML/CSS

Developer Tools: Git, Docker, Google Cloud Platform, VS Code, PyCharm, Eclipse

Libraries: Pytorch, TensorFlow, OpenCV, Pandas, NumPy, Matplotlib

SELECTED PUBLICATIONS

- H Basak, Z Yin. Pseudo-label Guided Contrastive Learning for Semi-supervised Medical Image Segmentation, **CVPR 2023**
- H Basak, Z Yin. Semi-supervised Domain Adaptive Medical Image Segmentation through Consistency Regularized Disentangled Contrastive Learning, **MICCAI 2023** [Early Accept: top 13%]
- H Basak, S Chattopadhyay, R Kundu, S Nag, R Mallipeddi. Ideal: Improved Dense Local Contrastive Learning For Semi-Supervised Medical Image Segmentation, **IEEE ICASSP 2023**
- H Basak, S Ghosal, R Sarkar. Addressing Class Imbalance in Semi-supervised Image Segmentation: A Study on Cardiac MRI, **MICCAI 2022**
- H Basak, R Bhattacharya, R Hussain, A Chatterjee. An Exceedingly Simple Consistency Regularization Method For Semi-Supervised Medical Image Segmentation, **IEEE ISBI 2022**
- H Basak, R Kundu, R Sarkar. MFSNet: A Multi Focus Segmentation Network for Skin Lesion Segmentation, **Pattern Recognition, Elsevier** [IF: 8.518]
- Kundu R, H Basak, Singh PK, Ahmadian A, Ferrara M, Sarkar R. Fuzzy rank-based fusion of CNN models using Gompertz function for screening COVID-19 CT-scans. **Scientific reports, Nature** [IF: 5.516]
- H Basak, R Kundu, PK Singh, MF Ijaz, M Woźniak, R Sarkar. A union of deep learning and swarm-based optimization for 3D human action recognition, **Scientific Reports, Nature** [IF: 5.516]
- H Basak, R Kundu, S Chakraborty, N Das. Cervical cytology classification using PCA and GWO enhanced deep features selection. **SN Computer Science, Springer** [IF: 1.55]

ACHIEVEMENTS/AWARDS

- **IEEE SPS Grant, 2023** for presenting work at IEEE ICASSP (Acceptance Rate - 1%).
- **MICCAI STAR Award, 2022** for exhibiting research at MICCAI (Acceptance Rate - 11%).
- **Gandhi Fellowship, 2021** for investigating AI for social good (Acceptance Rate - 9%).
- **Charpak Fellowship, 2020** for Summer Research Internship in France (Acceptance Rate - 28%).

MISCELLANEOUS

Teaching: CSE377 Medical Imaging, CSE214: Intro. to Data Structure.

Reviewer: CVPR, WACV, MICCAI, ICASSP, ISBI, TNNLS, TCSVT, Pattern Recognition.