

Soumadeep Saha

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Summary

My current research is focused on trying to inculcate key strengths of *symbolic AI* techniques, like *domain constraint adherence*, *logical coherence*, etc., into *deep learning* systems. I mostly work in *NLP*; however, since this problem shows up in many domains, I have explored problems in vision, medicine, biology, astrophysics, and diverse business applications.

My doctoral dissertation titled "*Domain Obedient Deep Learning*" is under review. I am currently working at CVPRU, *ISI Kolkata*, under the supervision of *Prof. Utpal Garain*.

Education

Indian Institute of Science Education and Research, Kolkata

KOLKATA, INDIA

5-year Integrated BS & MS

2015–2020

- ❑ Majored in **physics** with a minor in **mathematics**.
- ❑ Master's dissertation—**Towards Robust Deep Learning Systems**.

Bhavan's G.K. Vidyamandir

KOLKATA, INDIA

10+2 (Pre-University Secondary Education)

2002–2015

- ❑ Scored 91.2% in CBSE 10th standard and 92% in the senior secondary (12th standard) exams.
- ❑ Recipient of the prestigious National Talent Search Examination (NTSE) Scholarship from NCERT, Govt. of India.
- ❑ Recipient of the Kishore Vigyan Pratoshan Yojna (KVPY) fellowship from the Department of Science and Technology, Govt. of India.

Publications

- ❑ **Language Models are Crossword Solvers** S. Saha, S. Chakraborty, S. Saha, U. Garain
NAACL 2025 (main). Arxiv preprint, 10.48550/arXiv.2406.09043 Accepted 22/01/2025
- ❑ **On Measuring Intrinsic Causal Attributions in Deep Neural Networks** S. Saha, D. V. Rathore, S. Saha, D. Doermann, U. Garain
CLEaR 2025. Accepted 28/01/2025
- ❑ **Analyzing Semantic Faithfulness of Language Models via Input Intervention on Conversational Question Answering** A. Chaturvedi, S. Bhar, S. Saha, U. Garain, N. Asher
Computational Linguistics, 10.1162/coli.a_00493 Accepted 17/7/2023
- ❑ **VALUED - Vision and Logical Understanding Evaluation Dataset** S. Saha, S. Saha, U. Garain
DMLR, (13):1-18, 2024. Accepted 27/7/2024
- ❑ **MedTric : A clinically applicable metric for evaluation of multi-label computational diagnostic systems** S. Saha, U. Garain, A. Ukil, A. Pal, S. Khandelwal,
PLOS One, 10.1371/journal.pone.0283895 Accepted 20/3/2023
- ❑ **DOST – Domain Obedient Self-supervised Training for Multi Label Classification with Noisy Labels** S. Saha, U. Garain, A. Ukil, A. Pal, S. Khandelwal
AAAI 2024 Workshop (W3PHIAI), 10.1007/978-3-031-63592-2_10 Accepted 15/12/2023
- ❑ **LADDER: Revisiting the Cosmic Distance Ladder with Deep Learning Approaches and Exploring its Applications** R. Shah, S. Saha, P. Mukherjee, U. Garain, S. Pal
APJS, 10.3847/1538-4365/ad5558 Accepted 1/6/2024
- ❑ **Deep Learning Based Recalibration of SDSS and DESI BAO Alleviates Hubble and Clustering Tensions** R. Shah, P. Mukherjee, S. Saha, U. Garain, S. Pal
Arxiv preprint, 10.48550/arXiv.2412.14750 Under review at PRL.

Patents

- ❑ Method and System for Contradiction Avoided Learning for Multi-Class Multi-Label Classification
US Patent - US12038949B2 **S. Saha**, U. Garain, A. Ukil, A. Pal
Application Granted 16/07/2024
 - ❑ Method and System for Evaluating Clinical Efficiency of Multi-Label Multi-Class Computational Diagnostic Models
U. Garain, **S. Saha**, A. Ukil, T. Deb, S. Richa A. Pal, S. Khandelwal
Application No. 20221052587 *Filed on 14th September 2022.*
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Experience

- Helmholtz Visiting Researcher** Jul 24–Sep 24
Recipient of the Helmholtz Information and Data Science Academy (HIDA) visiting researcher grant to work at the Institute of Aerospace Medicine, DLR (German Aerospace Center).
 - Alleima** Mar 24–May 24
Worked on a computer vision-aided industrial automation scheme, delivering an end-to-end solution for object detection/tracking with cameras installed on the assembly line.
 - TCS Research** Nov 21 – Jul 22
Worked on diagnosing cardiovascular diseases from ECG signals. I started from scratch, analyzing the problem, and pointed out several key challenges that are not yet addressed in the literature and came up with state-of-the-art solutions, leading to two patents and publications.
 - Deep Analysis of Pain Management** Jun 20 – Nov 20
Collaborated with medical professionals in the field of radiodiagnosis to formulate a problem statement and set up data-gathering protocols to create a high-quality data set for the analysis of back pain from MRI images.
 - Teaching and Presentations**
 - ❑ Organized a 4-day workshop for DataLab, **Capital One**, Bangalore (2023).
 - ❑ Subject matter expert for Be10x–delivered video tutorials and live classes to 500+ participants (2024).
 - ❑ TA for Natural Language Processing course at ISI Kolkata (2022, 2023, 2024).
 - ❑ Instructor at the Winter School of Deep Learning (WSDL), ISI Kolkata (2021, 2022, 2023, 2024).
 - ❑ Instructor for the Comprehensive Course on Business Analytics, ISI Kolkata (2022).
 - ❑ Presented my work on Logically Coherent Deep Learning at Amazon Research Days (ARD 22).
 - ❑ Presented my work on domain-obedient self-supervision at W3PHIAI, 38th AAAI Conference, Vancouver, Canada (AAAI 24).
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Skills

- ❑ Significant expertise in NumPy, PyTorch and Python in general.
 - ❑ Well-versed in state-of-the-art NLP and vision architectures, models, and techniques.
 - ❑ Adept at Deep Reinforcement Learning (**DQN, PPO, MCTS, etc.**). Well-versed in time series modeling.
 - ❑ Have worked with several programming languages (C++, FORTRAN, bash, etc.) and am comfortable with Photoshop, GIMP, Premiere, 3D modeling (Blender), CAD (Onshape), \LaTeX , HTML/CSS, etc.
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Interests

- ❑ **DIY-ing**–I have an active interest in 3D printing, robotics, electronics, etc. I have conducted introductory workshops on robotics and was the Secretary of the Robotics and Astronomy Club at IISER Kolkata.
 - ❑ **Music**–Classically trained pianist and enjoy listening to and performing works by Chopin, Beethoven, etc.
 - ❑ **Sports**–Represented my college in national-level sports meets in basketball and volleyball. Played in my state's Senior Division Men's Basketball League.
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