

SABYASACHI SAHOO

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Ph.D. candidate with industry experience working on reasoning, generalization, robustness & efficiency.

EDUCATION

Mila, Inria, Université Laval	Aug 2021 - Present
Ph.D. in Machine Learning. Advisors: Christian Gagné & Frédéric Precioso . (GPA: 4/4)	(Expected: Apr 2027)
Keywords: <i>reasoning, generalization, robustness, efficiency, LLMs, VLMs, finetuning</i> .	
Indian Institute of Science (IISc) - Bangalore	2014 - 2016
Masters in Computational and Data Science. Advisor: Sathish Vadhiyar . (Top 5 in class)	
National Institute of Technology (NIT) - Surat	2010 - 2014
Bachelors in Mechanical Engineering.	

WORK EXPERIENCE

ServiceNow - Research Intern	Feb 2026 - Present
◦ LLM Web Agents : Blackbox VLM finetuning for visual grounding & collaboration-based task-specific steering.	
Amazon - Research Intern	
◦ LLM finetuning [1]: Improved LoRA finetuning by conditioning on CoT reasoning chains for entailment/math.	
NVIDIA - System Engineer II	
◦ Self-Driving Car Display : Implemented new features, reducing bugs (60%) and improving user experience.	
◦ Resource Management : Designed modular device tree framework, cutting cross-team development time (30%).	
◦ Xavier Chip's Launch : Implemented critical modules for successful launch & performance boost (25%).	
Donut Research Labs (Walmart) - NLP Engineer	May 2018 - Feb 2019
◦ Text Generation : Improved product brand name extraction accuracy (40%) using a Seq2Seq model, pretrained on product descriptions, fine-tuned on noisy annotations, and top-k sampling with beam search.	
◦ Extreme Text Classification : Class-imbalance-aware LSTM improved accuracy (25%) & sped inference (10%).	
◦ Product Specs Extraction/OCR : Single Shot Detector based information extraction, improving perf (35%).	
◦ Dataset Building : for text generation & OCR projects (collection, annotation, cleaning).	
IISc Bangalore (Ati Motors, Tata Motors) - Research Associate	Feb 2019 - Aug 2020
◦ Image Generation [11, 18, 26]: Enhanced LiDAR generation, high-res image generation & scene-flow prediction.	
◦ Robotics [7, 10, 28]: Differentiable SLAM framework & deployed cost-effective driver assistance system (ADAS).	
IISc Bangalore (Niramai) - Research Associate	Aug 2020 - Aug 2021
◦ Multi-Task Generalization [6, 25]: Improved domain adaptation and explainability for smartphone-transmitted X-rays using Multi-Task Learning and deployed it as a text-based reporting tool during the COVID-19 pandemic.	
◦ Model Explainability [15, 16, 27]: Aligned concept extraction with human understanding, improved it using non-negative matrix factorization, and exposed adversarial vulnerabilities in popular explainability methods.	

ACADEMIC EXPERIENCE

Mila, Université Laval - Student Researcher	Aug 2021 - Present
◦ Test-time Finetuning [3, 12]: Enhanced adaptation to distribution shifts using optimal layer selection for test-time adaptation and self-distillation of CLIP for zero-shot image classification.	
◦ OOD Generalization [9, 14]: Improved generalization to distribution shifts using out-of-distribution methods and denoising incorrect predictions using diffusion models.	
◦ Adversarial Robustness [2, 5, 13]: Enhanced adversarial defense by using softmax predictions to detect vulnerable samples cheaply and using test-time adaptation.	
◦ Out-of-Distribution (OOD) [4, 17]: Improved OOD detection using gradients from OOD prototype and optimized microservice partitioning by reformulating it into a reinforcement learning (RL) problem.	
◦ Continual Learning [8, 24]: Reduced forgetting in continual learning through hessian-aware low-rank approximation and showed that simple ensembling (bagging/dropout) can outperform complex strategies.	
Computational and Data Science, IISc Bangalore - Student Researcher	Aug 2015 - Aug 2016
◦ Visual Semantic Search [19]: Extracted hierarchical relationships between visually similar classes in CNNs.	
◦ Parallel Computing [20, 22]: Scaled scientific applications on supercomputers/GPU using MPI & CUDA.	

ONGOING WORKS

- S. Sahoo *et al.* Multi-Agent VLM Finetuning for Web Agents.
- S. Sahoo *et al.* Data Selection for Cross-Task/OOD Generalization.
- S. Menon, S. Sahoo *et al.* Learnable Layer Selection for Test-Time Finetuning.
- L. Caccia, S. Sahoo *et al.* Recovering Synthetic Datasets from Task Vectors.
- V. S. John, S. Sahoo *et al.* Multi-dimensional Evaluation Metrics for LLMs.

SELECTED PUBLICATIONS

- [1] S. Sahoo, N. Pappas, D. Manousakas, D. Bespalov, and G. Vietri. *Reasoning-as-Features: Explicitly Conditioning on Reasoning for Improved Architecture-Agnostic LLM Adaptation*. In: [\[link\]](#). Under review. 2026.
- [2] J. Ngnawe, S. Sahoo, Y. Pequignot, F. Precioso, and C. Gagné. *Robust Fine-Tuning from Non-Robust Pretrained Models*. In: [\[link\]](#). ICLR. 2026.
- [3] S. Sahoo, M. ElAraby, J. Ngnawe, Y. Pequignot, F. Precioso, and C. Gagné. *A Layer Selection Approach to Test Time Adaptation*. In: Association for the Advancement of Artificial Intelligence Conference. [\[link\]](#). AAAI. 2025.
- [4] M. ElAraby, S. Sahoo, Y. Pequignot, P. Novello, and L. Paull. *GROOD: GRadient-aware Out-Of-Distribution detection in interpolated manifolds*. In: Transactions on Machine Learning Research. [\[link\]](#) TMLR. 2025.
- [5] J. Ngnawe, S. Sahoo, Y. Pequignot, F. Precioso, and C. Gagné. *Detecting Brittle Decisions for Free: Leveraging Margin Consistency in Deep Robust Classifiers*. In: Advances in Neural Information Processing Systems. [\[link\]](#). NeurIPS. 2024.
- [6] M. Antony, S. T. Kakileti, R. Shah, S. Sahoo, C. Bhattacharyya, and G. Manjunath. *Challenges of AI driven diagnosis of chest X-rays transmitted through smart phones: a case study in COVID-19*. In: Scientific Reports Journal. [\[link\]](#). Nature. 2023.
- [7] P. Kumar, D. Vattikonda, V. B. S. Nadkarni, E. Dong, and S. Sahoo. *Differentiable SLAM Helps Deep Learning-based LiDAR Perception Tasks*. In: British Machine Vision Conference. [\[link\]](#). BMVC. 2023.
- [8] J. Li, R. Wang, Y. Lai, C. Shui, S. Sahoo, C. X. Ling, S. Yang, B. Wang, C. Gagné, and F. Zhou. *Hessian Aware Low-Rank Weight Perturbation for Continual Learning*. In: Transactions on Knowledge and Data Engineering Journal. [\[link\]](#). TKDE. 2023.
- [9] S. Sahoo, F. Zhou, Y. Pequignot, J. Ngnawe, F. Precioso, and C. Gagné. *Domain Generalization by Minimizing Out-of-Distribution Detection*. In: Montreal AI Symposium. [\[link\]](#). MAIS. 2022.
- [10] F. Aryan, D. Vattikonda, E. Dong, and S. Sahoo. *Grad-lidar-SLAM: Fully differentiable global SLAM for lidar with pose-graph optimization*. In: IROS Workshop on Probabilistic Robotics in the Age of Deep Learning. [\[link\]](#). IROS Workshop. 2022.
- [11] S. Sahoo, P. Kumar, V. Shah, V. Kondameedi, A. Jain, A. Verma, C. Bhattacharyya, and V. Vishwanath. *Dynamic to static lidar scan reconstruction using adversarially trained auto encoder*. In: Association for the Advancement of Artificial Intelligence Conference. [\[link\]](#). AAAI. 2021.

PREPRINTS

- [12] M. Sandhu, Y. Pequignot, S. Nashed, S. Sahoo, and L. Paull. *CLIP-Enhance: Improving CLIP Zero-Shot Classification via von Mises-Fisher Clustering*. [\[link\]](#). 2024.
- [13] K. Samanta, S. Sahoo, and C. Gagné. *Test Time Adaptation as an Adversarial Defense Strategy*. Internship Report. [\[link\]](#). 2023.
- [14] A. Verma, S. Sahoo, and C. Gagné. *Diffusion based Pseudolabeling under Distribution Shifts*. Internship Report. [\[link\]](#). 2023.
- [15] D. Tiwari, R. Shah, S. Sahoo, and C. Bhattacharyya. *Enhancing Explainability in Medical Images using Global Methods*. Masters Thesis. [\[link\]](#). 2022.
- [16] G. Parashar, S. Sahoo, and C. Bhattacharyya. *Adversarial Robustness for Local Interpretable Methods*. Masters Thesis. [\[link\]](#). 2021.
- [17] S. Sahoo and K. Sellami. *Automated Microservice Extraction using Reinforcement Learning*. [\[link\]](#). 2021.

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- [18] D. Shanbag, S. Sahoo, C. Bhattacharyya, and V. V. *An Approach For Accurate Sceneflow Prediction for LiDAR-based Sensors*. Masters Thesis. [\[link\]](#). 2020.
 - [19] S. Sahoo and V. Kondameedi. *Establishing Semantic relationships among Object Classes using Deep Networks for Image Classification*. [\[link\]](#). 2015.
 - [20] S. Sahoo and V. Kondameedi. *Hybrid Execution of Travelling Salesman Problem*. [\[link\]](#). 2015.

THESES

- [21] S. Sahoo, F. Precioso, and C. Gagné. “*Test-time Out-of-Distribution Generalization*”. PhD Proposal. [\[link\]](#). Mila/Université Laval, 2022.
- [22] S. Sahoo and S. S. Vadhiyar. “*Hierarchical Task Mapping on Dragonfly topology for Scaling Molecular Dynamics*”. Masters Thesis. [\[link\]](#). IISc Bangalore, 2016.
- [23] S. Sahoo, M. N. Yadav, V. Savalia, R. Soni, R. Agarwal, N. Lomash, and H. B. Naik. “*Thermoacoustic Energy Conversion Using Piezoelectric Diaphragm/Bi-Morph*”. Bachelors Thesis. [\[link\]](#). SVNIT Surat, 2014.

PROJECTS

- [24] S. Sahoo, S. Karami, A. Safarnejadian, and A. Tupper. *Deep Ensemble Methods for Vehicle Classification*. [\[link\]](#). Université Laval. 2021.
- [25] S. Sahoo, R. Shah, S. T. Kakileti, C. Bhattacharyya, and G. Manjunath. *A new AI-driven platform will facilitate early-COVID interventions over Whatsapp*. [\[link\]](#). Department of Science and Technology, Government of India. 2021.
- [26] T. Varshney, S. Sahoo, V. Kondameedi, and C. Bhattacharyya. *DCT-VAE: Capturing Low-level and High-level Features for Image Generation*. [\[link\]](#). IISc Bangalore. 2021.
- [27] S. Sahoo, A. Jain, R. Shah, and C. Bhattacharyya. *Improving Automatic Concept Extraction for Global Model Explainability*. [\[link\]](#). Niramai Health Analytix. 2021.
- [28] V. Kondameedi, S. Shet, A. Verma, S. Sahoo, P. Kumar, C. Bhattacharyya, and S. Biswas. *Frugal Advanced Driver Assistance System (ADAS) for Indian Roads*. [\[link\]](#). TATA Motors. 2020.
- [29] S. Sahoo, P. Kumar, C. Bhattacharyya, and V. V. *Proximal Pose Search for Adapting SLAM in Dynamic Environments on Slow Moving UGVs*. [\[link\]](#). Ati Motors. 2019.

TEACHING AND LEADERSHIP ROLES

- **Teaching Assistant**, Machine Learning course, Université Laval (2022/2023/2024): Involved with designing and grading quizzes/homeworks, and conducting tutorial sessions.
- **Student Mentor**, SHARE Research Labs (2020-21): Teaching and mentoring students for working towards a research paper for top-tier conferences.
- **Organizer** of various reading groups on topics like Machine Learning (2022-23), Out-of-Distribution (2022-25), and Autonomous Navigation (2019-20).
- **Placement Coordinator**, IISc (2015-16): Invited, organized, and coordinated on-campus placement for numerous industries and startups.

HONORS AND AWARDS

- Awarded IID Excellence scholarship 2022.
- Secured research funding from DEEL (2021-Present).
- Secured research funding from Ati Motors (2019-21), and ARTPARK (2021).
- Awarded distinction for my master's thesis.
- Won various competitions: 1st place in NeurIPS 2017 Challenge, top finalist in NVIDIA Reinforcement Learning Competition 2018, 3rd place in SO1 Product Recommendation Competition 2018.