Soham Chitnis

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Education

New York University, Courant Institute of Mathematical Sciences — *New York, NY*
Master of Science in Computer Science (*GPA: **4.0/4.0***) — September 2024 - May 2026

Birla Institute of Technology and Science Pilani (BITS Pilani) — *Goa, India*
Bachelor of Engineering in Computer Science, Minor in Data Science — November 2020 – July 2024

Skills

Languages: (Advanced): Python , (Intermediate): C++ , C, Java, SQL, HTML, CSS
Deep Learning frameworks: PyTorch, Tensorflow, JAX (Beginner), HuggingFace, PyTorch-Lightning
Python Libraries: Numpy, Scikit-Learn, OpenCV, Matplotlib, Pandas, DSPy, Langchain, Weights and Biases
Tools: GIT, LaTex, Linux, Windows, Microsoft Office, Postman

Experience

Graduate Student Researcher, New York University — January 2025 – Present
- **Project:** Exploring training paradigms for JEPA and Hierarchical JEPA

Undergraduate Student Researcher, APP Center for AI Research, BITS Pilani — February 2022 – May 2024
- **Project 1:** Deep learning for digital pathology image analysis
- Proposed domain-specific pre-trained feature extraction model for Whole Slide Image Classification using the state-of-the-art multiple instances learning methods and a new metric, Confidence, for the model's reliability.
- Improved confidence and achieved a new state-of-the-art performance of WSI-based glioma subtype classification (96.85 % AUC ROC), showing high clinical applicability in assisting glioma diagnosis.
- **Project 2:** LLM Agents for Critical Analysis and Review of Research Manuscripts
- Developed `AutoRef`, a multi-agent LLM-based system for generating reviews of scientific articles (reviewer agent), feedback of reviews (feedback agent), and an iterative algorithm to refine a review given the reviewing guidelines.
- Evaluated `AutoRef` on a subset of ICLR 2023 papers, the feedback scores improved by 15 % and 217 % when starting with machine-generated and human reviews, respectively.
- Presented at Association for Computational Linguistics ACL 2024

Research Intern, TCS Research, Pune, India — September 2023 – December 2023
- **Project:** Grounding Large Language Models for Chart Understanding
- Developed a multimodal model by grounding large language models to charts using LIMBER and investigated the impact of different language-image pre-training of visual encoders on VQA task. Fine-tuned CLIP with charts.

Visiting Scholar, Ontario Tech University, Ontario, Canada — June 2023 – August 2023
- **Project:** Hyperspectral Pixel Unmixing using Latent Dirichlet Variational Autoencoder for Remote Sensing
- Proposed spatial attention CNN encoder by extending Latent Dirichlet VAE that improves RMSE and SAD metrics.
- Delivered oral presentation at IEEE IGARSS 2024. Work as part of the MITACS Globalink Research Internship.

Research Assistant, Northeastern University, Boston, USA — October 2022 – April 2023
- **Project:** Investigating the oblique effect in Deep Neural Networks (DNNs)- CNNs & ViTs
- Generated synthetic benchmark datasets from ImageNet1K- Stylized, Randomized, Phase Scramble, Metameric, White Noise. Trained ResNets and Vision Transformers (ViTs) with generated datasets in a distributed setting.

Publications

- `AutoRef`: Generating Refinements of Reviews Given Guidelines — August 2024
  Chitnis S., Patwardhan, M., Srinivasan, A., Verlekar, T.T., Vig, L., Shroff, G. — SDP Workshop, ACL 2024
- SpACNN-LDVAE: Spatial Attention Convolutional Latent Dirichlet Variational Autoencoder for Hyperspectral Pixel Unmixing — July 2024
  Chitnis S., Mantripragada, K., Qureshi, F.Z. — IEEE IGARSS 2024
- Domain-Specific Pre-training Improves Confidence in Whole Slide Image Classification — July 2023
  Chitnis S.R., Liu, S., Dash, T., Verlekar, T.T., Di Ieva, A., Berkovsky, S., Vig, L., Srinivasan, A. — IEEE EMBC 2023

Selected Projects

JEPA World Model using Psuedo Recurrent Networks December 2024

- Trained and successfully avoided collapse while training the JEPA world model. Based on the Markov property, the Psuedo Recurrent Network was implemented (without any hidden state).
- Achieved 3^{rd} rank by performance on hidden datasets. Work as part of Deep Learning taught by Prof. Yann LeCun & Prof. Alfredo Canziani.

Video Vision Transformers (ViViT) for 3D Medical Images April 2023

- Implemented Video Vision Transformer (Original Implementation in JAX) with all variants for 3D Medical Images: MRIs, CT scan in PyTorch. Work done as part of Deep Learning (CS F425)

Super-Resolution ResNet (SRResNet) & Super-Resolution CNN (SRCNN) March 2022

- Implemented SRResNet & SRCNN paper on Oxford-IIIT Pet Dataset, Conducted experiments and study on interpolation modes & upsampling methods. Code: github/SRCNN-implementation

Project Kratos August 2021 - April 2023

- Developing Mars Rover for Rover Challenges. Worked on developing models for Rock analysis using Computer Vision to detect the presence of life in rocks.

Co-curricular Activities

- A core member of the Society for Artificial Intelligence & Deep Learning (SAiDL), Electronics & Robotics Club and Life Sciences Team, Project Kratos during undergrad.
- Organized annual AI Symposium with APPCAIR in 2022 as a member of SAiDL. I hosted a talk on Graph Neural Networks during the Symposium.
- Organized a Machine Learning Hackathon for the TechWeek, Center for Technical Education in the college.

Honors & Awards

MITACS Globalink Research Internship at Ontario Tech University 2023
Silver Prize, Machine Learning Hackathon by CTE, BITS Pilani 2021
100 percentile in Maharashtra (State-level) Engineering Entrance Test 2020
(Physics-Chemistry-Mathematics & Mathematics)