Soham Rohit Chitnis

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Education

Birla Institute of Technology and Science, Pilani — *Goa, India*

B.E Computer Science, Minor in Data Science — *Nov. 2020 -Present*

- **CGPA** - 8.62/10
- **Relevant Completed Official Coursework:** Operating Systems, Computer Architecture, Computer Programming, Data Structures & Algorithms, Theory of Computation, Discrete Structures for Computer Science, Machine Learning, Deep Learning, Fundamentals of Data Science, Linear Algebra, Probability & Statistics, Calculus
- **Thesis:** *Grounding Large Language Models for Chart Understanding* (Link)

Thakur College of Science & Commerce — *Mumbai, India*

Class XII, Maharashtra State Board of Secondary and Higher Secondary Education — *2019 - 2020*

- **Percentage:** 90.77%

Research Interests

Computer Vision, Deep Learning, Machine Learning, Artificial Intelligence

Research Experience

Tata Consultancy Services Research — *Pune, India*

Research Intern — *Sept. 2023 - Dec. 2023*

- **Project:** Grounding Large Language Models for Chart Understanding
- **Supervisor: Dr. Manasi Patwardhan**
- Explored efficient grounding large language models to charts and investigated the impact of language-image pre-training of visual encoders on Chart VQA task. Found contrastively pre-trained models (CLIP & ChartCLIP) more efficient than non-contrastively pre-trained (DePlot) during training while achieving similar results.

Visual Computing Lab, Ontario Tech University — *Toronto, Canada*

Visiting Scholar | Website | Certificate — *June 2023 - August 2023*

- **Project:** Hyperspectral Pixel Unmixing using Latent Dirichlet Variational Autoencoder for Remote Sensing
- **Supervisor: Prof. Faisal Qureshi**
- Extending the Latent Dirichlet VAE to incorporate spatial information. Proposed an isotropic spatial attention CNN encoder that improves RMSE (abundance estimation) and SAD (endmember extraction) metrics for the unmixing task.
- Contributed patch-level data loader for HSI Dataloader python library. Wrote a research paper. Work done as part of MITACS Globalink Research Internship

APP Center for AI Research (APPCAIR), BITS Pilani — *Goa,India*

Undergraduate Researcher | Website — *Feb. 2022 - June 2023*

- **Project 1:** Deep-learning methods for digital pathology image analysis
- **Supervisor: Prof. Tanmay Verlekar**, **Dr. Tirtharaj Dash**, **Prof. Ashwin Srinivasan**
- **Collaborators: Dr. Sidong Liu**, Macquarie University, Sydney
- Proposed domain-specific pre-trained feature extraction model for Whole Slide Image Classification using the state-of-the-art multiple instances learning methods: CLAM & TransMIL and a new metric, Confidence for the same. The proposal improves confidence and achieves a new state-of-the-art performance of WSI-based glioma subtype classification, showing high clinical applicability in assisting glioma diagnosis.
- **Project 2:** Molecule Generation using Graph Autoencoders & Variational Graph Autoencoders.

The Kwon Lab for Low Vision and Brain Research, Northeastern University — *Boston, USA*

Research Assistant | Website — *Oct. 2022 - April 2023*

- **Project:** Investigating the oblique effect in Deep Neural Networks (DNNs)- CNNs & ViTs
- **Supervisor: Alish Dipani**, **Prof. MiYoung Kwon**
- Creating synthetic benchmark datasets from ImageNet- Stylized, Randomized, Phase Scramble, Metameric, White Noise. Conducted literature review, trained ResNets, and Vision Transformers (ViTs) on datasets, and devised an evaluation for investigating the Oblique Effect in DNNs.

Central Electronics Engineering Research Institute (CSIR-CEERI) — *Chennai,India*

Research Intern | Website | Code | Report — *May 2022 - July 2022*

- **Project:** Automated Plastic Segregation using Hyperspectral Imaging for Recycling Plant
- **Supervisor: Dr. Madan Kumar Lakshmanan, Prof. Amalin Prince A.**
- Implemented Pre-processing pipeline for HSI data and CNN models
- Built a dedicated data augmentation module: Random Crop & Resizing, Horizontal Flip, Colour Jitter for HSI and experimented with Self-supervised learning method: SimCLR for HSI.

Publications & Preprints

1. **Chitnis, S.R.**, Liu, S., Dash, T., Verlekar, T.T., Di Ieva, A., Berkovsky, S., Vig, L. and Srinivasan, A., 2023. **Domain-Specific Pre-training Improves Confidence in Whole Slide Image Classification**. (Published & Accepted at IEEE EMBC 2023 as Oral Presentation) Link: Paper, Slides & Code

2. **Chitnis, S.**, Mantripragada, K., Qureshi, F.Z., 2023. **SpACNN-LDVAE: Spatial Attention Convolutional Latent Dirichlet Variational Autoencoder for Hyperspectral Pixel Unmixing** Link: Paper & Code

Teaching Experience

Introduction to Deep Learning, Quark Controls BITS Pilani Goa *Online*

Instructor *July 2022 - August 2022*

- Taught the course "Introduction to Deep Learning" to 200+ students and mentored first-year students for the final project.

Computer Programming, BITS Pilani *Goa, India*

Teaching Assistant *May 2022 - August 2022*

- Conducted doubt solving sessions, evaluated labs and assisted Prof. Anup B Mathew & Prof. Arnab K Paul.

Mathematics-I (Multivariate Calculus), Academic Assistance Program CTE *Goa, India*

Mentor *Dec. 2021 - May 2022*

- Mentored first-year students for Mathematics-I (Multivariate Calculus) and conducted doubt-solving sessions.

Selected Projects

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

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

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

Code & Report

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

Comparative Study of Reward functions with Policy gradient (RL) *August 2021*

Code & Report

- Conducted a comparative study on different reward functions with Policy gradient algorithm to find minima of two variable quadratic function

Project Kratos *August 2021 - April 2023*

Website

- Developing Mars Rover for Rover Challenges. Worked on developing models for Rock analysis using Computer Vision to detect the presence of life in rocks.
- Selected as Top 36 Teams for University Rover Challenge, USA; Scored 95/100 in Life Sciences Task; Awarded Asia 2nd Best Rover

Skills

- **Languages:** Python, C/C++, Matlab, Java
- **Deep Learning Frameworks:** PyTorch, Tensorflow, Keras
- **Tools:** GIT, LaTex, Linux, Windows, MS Office
- **Python Libraries:** Numpy, Scikit-Learn, OpenCV, Matplotlib, Pandas, Scipy, Pyro

Co-curricular Activities

- Core member of the Society for Artificial Intelligence & Deep Learning (SAiDL), Electronics & Robotics Club and Life Sciences Team, Project Kratos.
- 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 organized by the Center for Technical Education in the college.

Extracurricular Activities

Took the initiative in implementing a Butterfly Garden in the nearby Municipal Garden with the help of a Local Municipal Corporator and planted around 100 plants to enrich and conserve biodiversity: flora and fauna of the neighborhood. Inspired by my work, the local governing body has implemented in several municipal parks.

Honors, Scholarships & Awards

2023	**MITACS Globalink Research Scholarship for Internship,** MITACS, Canada	*Goa, India*
2021	**Silver prize,** Machine Learning Hackathon, Center for Technical Education, BITS Pilani	*Goa, India*
2020	**100 percentile (Physics-Chemistry-Mathematics & Mathematics) ,** Maharashtra Common Entrance Test	*Mumbai, India*
2020	**INSPIRE Scholarship (For securing rank in the top 1 percentile in Class XII Examination),** MSBSHSE	*Mumbai, India*
2018	**Rising Star Award for Mathematics,** Cambridge School	*Mumbai, India*
2017	**Silver Medal,** Dr. Homi Bhabha Young Scientist Competition (State-level)	*Mumbai, India*
2016	**Sir CV Raman Science Scholarship (State-level) & Award,** Vasai Vidnyan Parishad	*Mumbai, India*