Dav Vrat Chadha

davvrat.chadha@mail.utoronto.ca in/davvratchadha github.com/davvratchadha davvratchadha.com

Education

B.A.Sc. in Engineering Science, University of Toronto — **Toronto, ON, Canada**
Major: Machine Intelligence — *Sep 2020 – Apr 2025*

Skills & Tools

• Python • Tensorflow • PyTorch • NumPy • NLP • AI • ML • Sklearn • Keras • CUDA • Jax • Objax • spaCy • Cython • C/C++ • Embedded Systems • Parallel Programming • Performance Optimization • Automation Frameworks • CI/CD • Git • MATLAB • Linux • Java • MySQL • JavaScript • HTML • CSS

Professional Experience

Software Engineer Intern, Memory team — **Markham, ON, Canada**
AMD - DCGPU — *May 2023 - present*

- Developed a memory validation and debug tool, SuperScript, as a **Python** library with CLI capabilities, significantly improving data integrity and reducing debugging time. Enhanced user efficiency and productivity, has been used over **60,000 times**, and is now a dependency for several other AMD tools.
- Engineered a 4pt HBM-PHY margin testing tool for filtering bad MI300X parts **during manufacturing**, with aim to reduce customer RMAs.
- Designed and created a memory characterization tool, Char_wizard, reducing characterization time by **40%** (or 140 hrs) with **innovative grid search algorithms**. Improved runtime complexity from $\mathbf{O}\left(\mathbf{n^2}\right)$ to $\mathbf{O}\left(\mathbf{n}\right)$. Applied **decision trees** to traverse grids and determine unique test points for each system on the fly. Incorporated **concurrency** to run characterization on multiple processor dies simultaneously. The tool has been used for over **1,200 hours**.
- Contributed to AMD **automation frameworks** and infrastructure, including Orc3, Conductor, and Middleware. Developed memory automation tests and pioneered automation for Bit Error Rate testing for all MI300 platforms. Additionally, contributed to the successful HBM3 debug process during the El Capitan supercomputer bring-up phase.
- Collaborated with memory vendors including Samsung, Hynix, and Micron, providing constant **DevOps** support for debugging and validation. Supported other AMD MI300 teams in their debugging and validation efforts.

Projects

ML Engineer - FINCH Satellite Mission — **Toronto, ON, Canada**
University of Toronto Aerospace Team — *Sept 2023 - present*

- Implemented a novel **diffusion model** conditioned on neighboring spectral frames for **destriping** hyperspectral images resulting in PSNR = 39.2274, LPIPS = 0.2214, SSIM = 0.8817, and SAM = 0.0423, for the ICVL-HSI dataset.
- Worked on the hyperspectral data augmentation pipeline in **PyTorch**, utilizing a modified image patch extraction technique to create new images out of existing ones to increase the size of the training and validation dataset.
- Operated in an **agile** environment, contributing to continuous improvement and innovation within the team.

ML Engineer - NoPunIntended — **Toronto, ON, Canada**
Repository; Try API — *Jan 2023 - Apr 2023*

- Worked in a team to create a large dataset of puns and their explanations, each sentence tagged using a new tagging scheme.
- Utilized an ensemble of **transformer**-based **LLMs DeBERTa** and **RoBERTa** to detect and locate puns with contextual masking using K-means.
- Built upon research done by Amazon to improve the existing methods and achieved **75.58%** test accuracy, which is competitive to GPT-4 performance (82.77%).

Publications

- Ian Vyse et al., *Beyond the Visible: Jointly Attending to Spectral and Spatial Dimensions with HSI-Diffusion for the FINCH Spacecraft*, To appear in 38th Annual Small Satellite Conference, 2024. DOI: 10.48550/arXiv.2406.10724

Honors & Awards

- Innovation Showcase Award, Mar 2024
  Recognized for pioneering use of decision trees to optimize the characterization and margin testing process for the HBM3-PHY interface, significantly minimizing runtime and improving overall efficiency.
- AMD Executive Spotlight Award, Dec 2023
  Recognized for designing and developing the memory characterization tool, Char_wizard, and pioneering innovations including Fmax correlation automation and the memory debug tool, SuperScript, for all MI300 platforms.