RISHIT DAGLI

Research Interests: Learning Algorithms, Vision, Language Modelling, Multimodality, Pure Math
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EDUCATION

Hon. Bachelors of Science, Computer Science (3rd year: course overload), University of Toronto 2022-2025
Received scholarship from Vector Institute; and entry scholarship from the University of Toronto
I have had the pleasure of working on research with these people at UofT: Nandita Vijaykumar, David Lindell, Rahul Gopal Krishnan, Pascal Tyrrell, and Houman Khosravani
Research Labs: DGP Lab (for AI and Computer Vision), Vector Institute
President and founded the UofT Computer Vision Club, Part of the UofT CS Student Union Council.

High School, Narayana Junior College 2020-2022
Received scholarship from Narayana Junior College.
Top 1% Nationally in International Junior Science Olympiad, Part of Team India at World Robotics Olympiad
Made past all national level qualifier rounds: International Math Olympiad and International Olympiad on Astronomy

Summer School, Stanford University 2019
Passed with distinction for the course "Statistical Learning", a course on supervised learning.

SKILLS

Python • TensorFlow • Machine Learning • Computer Vision • PyTorch • Kubernetes • CUDA • GCP
Git • Linux • C++ • HTML • Firebase • Android • Kotlin • SQL • Rust • Research

SELECT RESEARCH

My community service: member of the program committee for ICLR Tiny Papers 2023; reviewer for ICLR PML4DC 2023, NeurIPS 2023, Cloud Native Wasm Day, and ICLR 2024.

[1] Rishit Dagli, Joana Materzynska Guillaume Berger, Ingo Bax, and Roland Memisevic. Airletters: An open video dataset of characters drawn in the air. *ECCVW*, 2024.

[2] Rishit Dagli, Atsuhiro Hibi, Rahul G. Krishnan, and Pascal Tyrrell. Nerf-us: Removing ultrasound imaging artifacts from neural radiance fields in the wild. *PMLR*, 2024.

[3] Rishit Dagli, Shivesh Prakash, Robert Wu, and Houman Khosravani. See-2-sound: Zero-shot spatial environment-to-spatial sound. *arXiv preprint arXiv:2406.06612*, 2024.

[4] Ian Vyse and et al. Beyond the visible: Jointly attending to spectral and spatial dimensions with hsi-diffusion for the finch spacecraft. In *SSC*, 2024. (Oral).

[5] Hamza Mahdi et al. Tuning in: Analysis of audio classifier performance in clinical settings with limited data. In *PMLR*, 2024.

[6] Rishit Dagli. Diffuseraw: End-to-end generative raw image processing for low-light images. *arXiv preprint arXiv:2402.18575*, 2023.

[7] Rishit Dagli and Shivay Lamba. Pytorch made efficient for the edge: Wasi-nn. In *PyTorch Conference*, 2023.

[8] Rishit Dagli and Shivay Lamba. Orchestrating machine learning on edge devices with pytorch and webassembly. In *PyTorch Conference*, 2023. (Oral).

[9] Rishit Dagli. Astroformer: More data might not be all you need for classification. In *ICLRW*, 2023.

[10] Rishit Dagli and Ali Mustufa Shaikh. Cppe-5: Medical personal protective equipment dataset. *SN Computer Science*, 4(3):263, 2023.

HONORS AND AWARDS

Invited to give a TEDx talk and TED-Ed talk 2020-2022
Google Research Grant, sponsors all infrastructure costs to work on research projects 2022-2023
Google Open Source Expert prize, given to individuals contributing extensively to the open-source AI ecosystem in terms of reproducible papers, open-source models, or open-source implementations. 2022
Linux Foundation Scholarship, given to open-source contributors to Linux Foundation projects. 2022-2024
PyTorch top-contributor, being one of the top contributors to PyTorch, I was featured for an interview with Meta on the CNBC TV channel and YouTube highlight top PyTorch contributors 2022
Microsoft Green Hackathon, Won the hackathon and was featured on Microsoft Blog and YouTube 2022
TensorFlow Community Spotlight, received the award for my recent Machine Learning paper, awarded to ML projects making using TensorFlow for high-quality projects with a lot of impact 2022
PapersWithCode top contributor award, received the award for my work in the field of ML 2022
Research Grant by Intel, sponsors infrastructure cost for working on research projects 2021
TensorFlow, thanked publicly multiple times by TensorFlow Team for my open-source code contributions to TensorFlow on the TensorFlow GitHub releases page 2021-2022
Software Grant by Google Cloud, sponsors infrastructure for my open-source projects 2021
freeCodeCamp top contributor award, for being one of the top contributors to freeCodeCamp, the most popular open-source project on GitHub, and my contributions to community ML content 2021

PROJECTS

I also maintain and have built other open-source projects on GitHub, some popular libraries too.

MIRNet-TFJS GitHub • TF Hub

- This project implements and proposes a model for enhancing low-light images. The project also demonstrates new recipes to optimize ML inference processes to allow them to run on the web on the client side.
- The project also implements a novel architecture based on CNNs with parallel multi-resolution convolution streams to extract multi-scale features while allowing the architecture to share information across channels.

Fast Transformers GitHub

- I implemented a new Transformer architecture, Fastformer, a Transformer Variant that can handle far longer input sequences than current ones and runs by modifying self-attention to run in a lesser time complexity. I also made this ready-to-use for anyone as a library.
- I use additive attention to model global contexts, and transform token representation based on global context.

Gradient Centralization GitHub • PyPI

- Created and implemented a new Machine Learning recipe to train models based on backpropagation of gradients faster and more efficiently by modifying the gradients in a certain way after each pass, available as a library
- I modify the gradients after each iteration by centralizing the gradient vectors to have zero mean.

TF Watcher GitHub • Website • Docs

- Industry scale project which allows monitoring Machine Learning training, evaluation, and prediction processes on mobile phones with as little as 2 lines of code and is compatible with all kinds of Machine Learning Code.
- Won the Major League Hacking (MLH) Fellowship Hackathon.

3D Transforms GitHub

- Created a new Machine Learning library which made it very easy to work with 3D data and perform 3D transforms. This library made working with sparse tensors, quaternions, and special orthogonal groups.
- Involved running large-scale 3D operations, custom-making autodiff methods for new operations introduced with the library, as well as optimizing operations based on the C-Python bindings.

EXPERIENCE

(Upcoming) Research Scientist January 2025 -
NVIDIA *Toronto, ON*

- With Gavriel State to work on research around generative vision models and 3D reconstruction.

Research Intern May 2024 - September 2024
Qualcomm AI Research *Toronto, ON*

- I work on academic Computer Vision research, advised by Guillaume Berger and Roland Memisevic.
- I am working on (1) precise video generation (under submission) and (2) video question answer (work in progress).
- First-authored an under-submission paper on a novel diffusion model for precisely guided video generation and introduced a new large dataset of 165k videos. I performed all the large-scale experiments needed for this research which also involved writing software to run my experiments on more than 200 GPUs.

Student/Part-Time Research Scientist May 2023 - April 2023
Civo Cloud *Remote from Toronto, ON*

- I work on academic Computer Vision research, we are currently working on a new multimodal speech and vision model we came up with while also working on some machine learning engineering problems.
- I led the work on a new machine-learning runtime for the product, "Recite" accelerating performance by $\sim 120-200\%$ for a variety of models over other highly optimized open-source runtimes and improved portability, by implementing symbolic shapes in XLA compilers specifically for the kind of models we were researching (and then put in production) and writing WebAssembly bindings for these models.
- I worked on a new end-user product, "KFaaS" as a unified machine learning platform causing massive individual user adoption as well as adoption from Electronic Arts and Mercedes-Benz by building a new tool for scheduling training jobs in large environments inspired by our own problems in managing resources for machine learning.

Student/Part-Time Research Scientist, Machine Learning 2021-2022
James Webb Space Telescope *Remote from Mumbai, India*

- I worked on academic Computer Vision research, for astronomy and science tasks around exoplanets.
- I worked on developing a new set of machine-learning models for discovering the composition of exoplanets from JWST's Near-IR sensors/cameras which before JWST and our team was impossible to do. This led to our models being used for one of the first discoveries of the "exoplanet detection proposal (JWST)", LHS-475b, and for the first time, we were also able to identify the exact composition of the exoplanet and its atmosphere.

Apart from this, I previously held engineering roles, I was also an MLH (Major League Hacking) Fellow, an intern at Robotron Labs, and a Teaching Assistant at Science Kidz.

OPEN-SOURCE AND COMMUNITY

• **TensorFlow** contributed extensively to TensorFlow in the past mainly TensorFlow Hub, and was also the second biggest individual contributor to TensorFlow Hub, awarded the TensorFlow Community Spotlight award
• **Keras** contributed multiple architectures (most popularly wrote MobileNetV3 in Keras) and Keras Examples
• **Kubernetes** part of the 1.26, 1.27, 1.28 Release Team, a select small team that releases a new version of Kubernetes, while also being one of the maintainers of Kubernetes mainly involved with SIG API-Machinery.
• **Kubeflow** part of 1.17 Release Team, the team that releases Kubeflow 1.17
• **WASI, Wasm** Active open-source contributor to WebAssembly System Interface (WASI), program committee member for the official WasmCon and Cloud Native Wasm Day, contributed towards building one of the most popular educational reference video for WebAssembly (Wasm).
• Core creator and maintainer of Microsoft's ML For Beginners, now with >60K GitHub Stars.
• Authored multiple blogs on Personal Blog impacting 100,000+developers
• Mentoring for the Kubeflow organization for Google Summer of Code 2024.
• Spoke at technical software conferences sharing my knowledge with others.
• Led the efforts to host the official Kubernetes Contributor Summit in NA and EU.