

Daniel Cher

✉ cher@wustl.edu |  [dcher95.github.io](https://github.com/dcher95) |  Google Scholar |  LinkedIn

Education

Washington University in St. Louis
Ph.D. in Computational Data Sciences

St. Louis, MO
Sep 2024 – present

Worcester Polytechnic Institute
M.S. in Data Science

Worcester, MA
Jan 2019 – Dec 2021

Boston University
B.A. in Economics
B.S. in Business Administration, Concentration in Finance and Accounting

Boston, MA
Sep 2013 – May 2017

Honors & Fellowships

AI-ACCESS Fellow, Washington University in St. Louis

2024 – present

Olin Chancellor's Fellow, Washington University in St. Louis

2024 – present

Publications

Peer-Reviewed

- [1] **Cher, D.**, Iqbal, H., Xing, E., Wei, B., Jacobs, N. *Tessellating the Earth: Learnable Spherical Voronoi Partitions for Location Encoding*. **ECCV'26**.  [arXiv:2606.27514](https://arxiv.org/abs/2606.27514) 
- [2] Wei, B.^{*}, Sastry, S.^{*}, **Cher, D.**^{*}, Xing, E., Jacobs, N. *TerraDiT- Ω : Unified Spatial Control for Satellite Image Synthesis with Any Geospatial Primitive*. **ECCV'26**.  [arXiv:2606.31029](https://arxiv.org/abs/2606.31029) 
- [3] Sastry, S., Khanal, S., Dhakal, A., Lin, J., **Cher, D.**, Jarosz, P., Jacobs, N. *ProM3E: Probabilistic Masked MultiModal Embedding Model for Ecology*. **CVPR'26**.  [arXiv:2511.02946](https://arxiv.org/abs/2511.02946) 
- [4] **Cher, D.**^{*}, Wei, B.^{*}, Sastry, S., Jacobs, N. *VectorSynth: Fine-Grained Satellite Image Synthesis with Structured Semantics*. **WACV'26**, Tucson, AZ.  [arXiv:2511.07744](https://arxiv.org/abs/2511.07744) 
- [5] Sastry, S.^{*}, **Cher, D.**^{*}, Wei, B.^{*}, Dhakal, A., Khanal, S., Gupta, D., Jacobs, N. *TerraDiT: Point-Conditioned Diffusion Transformer for Satellite Image Synthesis*. **ECCVW'26** (TerraBytes II).  [arXiv:2603.02172](https://arxiv.org/abs/2603.02172) 

Preprints & Under Review

- [6] **Cher, D.**, Xing, E., Li, K., Wei, B., Jacobs, N. *Chronosphere: Mixture of Implicit Spacetime Tessellations*. (**AAAI'27 Submission**).
- [7] Xing, E., Li, V., **Cher, D.**, Jacobs, N. *QuASI: Query-Adaptive Sparse Indexing for Search*. (**AAAI'27 Submission**).
- [8] **Cher, D.**, Wei, B., Xing, E., Jarosz, P., Sandvig, R., Jacobs, N. *Phenological Plant Embeddings*. (**NeurIPS'26 Submission**).

^{*} denotes equal contribution.

Presentations & Technical Reports

- [1] **Cher, D.** 2023. *Geographic Rating in Insurance Pricing*. White paper written for internal product pricing modeling groups. Disseminated companywide to local pricing modeling teams.
- [2] **Cher, D.**, Meng, S. 2022. *Leverage Unlabeled Data with Contrastive Learning*. Session presented at the 11th Annual Liberty Mutual Data Science Forum, Boston, MA.

- [3] **Cher, D.** 2021. *Advances in Geospatial Residual Modeling: Leveraging luigi for Experimentation*. Session presented at the 10th Annual Liberty Mutual Data Science Forum, Boston, MA.
- [4] **Cher, D.,** Dichiaro, A., Alsaedi, M., Tang, S. 2021. *Modeling PFAS risk predictions and source attribution for private drinking water wells in MA: A multi-faceted study on toxic forever chemicals using computational analysis and machine learning*. Study disseminated to MassDEP stakeholders. Project presented at the 5th Annual Graduate Research Innovation Exchange, Worcester, MA. 

Working Experience

Washington University in St. Louis

St. Louis, MO

Ph.D. Student, Multimodal Vision Research Laboratory

Sep 2024 – present

- Collaborated with researchers across three universities on food insecurity, developing a geospatial engine that answers analytical questions about food security worldwide.
- Collaborated with researchers across three universities and industry partners on geographic implicit neural representations, generating more efficient representations that are task-aligned.
- Mentored four undergraduate researchers (three through the Center for the Environment Summer Undergraduate Research Program, one through a WashU-funded REU) and one M.S. student.

Liberty Mutual

Boston, MA

Assistant Director, Data Science — Geospatial Modeling

Jan 2022 – Apr 2024

- Improved geographic price segmentation by incorporating geodemographic similarity into proprietary smoothing algorithms and engineering features from open-source raster data (weather, terrain, land cover). Packaged algorithms as scikit-learn regressors to standardize the modeling interface and enable Optuna hyperparameter search. 2.5–4% relative loss ratio improvement on US auto and home businesses (\$1B+ book of business).
- Managed four data scientists and led the *Geospatial Modeling* training series (ten lectures covering data sourcing through deployment) for ten data scientists across three international regions. Directed five geospatial pricing projects as manager and reviewer; each region then owned its own geospatial modeling.
- Authored *Geographic Rating in Insurance Pricing*, an internal white paper on quantifying geographic risk (feature engineering, variable selection, peril-specific modeling, clustering), distributed companywide.

Data Scientist, Geospatial Modeling

Sep 2017 – Jan 2022

- Lead developer of the territory-pricing pipeline (luigi + mlflow): ingests data, fits and compares territory-risk models, persists hyperparameters and artifacts to S3, and surfaces results in a shareable dashboard. Cut FTE modeling time 80% and made runs reproducible.
- Subject-matter expert for international territory pricing across Portugal, Colombia, Brazil, Spain, and Thailand. Performed spatial clustering, feature engineering from external datasets, and smoothing to correct spatial autocorrelation. 4% loss ratio improvement on a \$500M+ book of business in Brazil.
- Lead developer of **terripy**, the internal geospatial modeling package, which included geospatial data classes, feature engineering transformations, and proprietary algorithms, adopted companywide.
- Built an at-fault classifier over unstructured claim narratives with fast.ai, combining text and structured features. Developed with two teammates during a companywide data science competition and subsequently adopted by the business.

Additional Research Experience

Aerial Imagery Research @ Liberty Mutual

Spring 2022

Research project exploring benefits of contrastive learning on property roof computer vision models.

- Researched contrastive learning architectures to decrease labeling needs of computer vision models. Found that contrastively trained model using domain-specific images outperformed general supervised pre-trained models like ones built on ImageNet.

- Developed contrastive learning models using clustering (SwAV), contrastive-instance (MoCoV2), and contrastive-network (BYOL) based architectures using PyTorch with PyTorch Lightning integrations.
- Tested pre-trained models using transfer learning to improve classification models of roof features including existence of solar panels and roof condition. Showed improved model performance by 2% F1 score.
- Presented research at the annual Data Science Forum in collaboration with the project sponsor.

Skills

Methods: diffusion transformers, contrastive and self-supervised learning, multimodal representation learning, vision-language models, location encoding, spatiotemporal modeling, remote sensing, machine learning, deep learning

Coding Languages: Python, R, SQL

Libraries: PyTorch, Lightning, Hugging Face (diffusers, transformers), open_clip, xformers, torchgeo, geopandas, rasterio, GDAL, scikit-learn

Tooling: hydra, wandb, mlflow, Optuna, luigi, SLURM, Docker, AWS, Snowflake, Earth Engine, QGIS, ArcGIS, Git

Spoken Languages: Russian (fluent), Japanese (conversational)