Dehao Yuan

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Expertise: Machine Learning Computer Vision Event Camera Point Cloud
Tabular Data Time Series Large Language Model
python C++ CUDA numpy pytorch transformers opencv flask

Education & Employment

Applied Researcher I, Manager. Jun. 2, 2025 — Now
Capital One, McLean VA.

Ph.D. in Computer Science. Aug. 23, 2021 — May 22, 2025
University of Maryland, College Park (UMD).

B.Sc. in Mathematics and Economics & Data Science and Technology. Sep. 1, 2017 – Jul. 14, 2021
Hong Kong University of Science and Technology (HKUST).
Worked as a research assistant on computational environmental science for three years.

Publication — as a Ph.D. student at UMD.

1. A Real-Time Event-Based Normal Flow Estimator.
   D. Yuan, C. Fermüller.
   Technical Report. Paper Code
2. Learning Normal Flow And Egomotion Directly From Events.
   D. Yuan, L. Burner, J. Wu, M. Liu, J. Chen, Y. Aloimonos, C. Fermüller.
   International Conference on Computer Vision, ICCV 2025. Paper Code
3. Repurposing Pre-trained Video Diffusion Models for Event-based Video Interpolation.
   J. Chen, B.Y. Feng, H. Cai, T. Wang, L. Burner, *D. Yuan*, C. Fermüller, C.A. Metzler, Y. Aloimonos.
   The IEEE/CVF Conference on Computer Vision and Pattern Recognition, CVPR 2025. Paper Code
4. A Linear Time and Space Local Point Cloud Geometry Encoder via Vectorized Kernel Mixture (VecKM).
   D. Yuan, C. Fermüller, T. Rabbani, F. Huang, Y. Aloimonos.
   International Conference on Machine Learning, ICML 2024. Paper Code
5. Decodable and Sample Invariant Continuous Object Encoder.
   D. Yuan, F. Huang, C. Fermüller, Y. Aloimonos.
   International Conference on Learning Representation, ICLR 2024. Paper Code
6. Discovering Object Attributes by Prompting Large Language Models with Perception-Action APIs.
   A. Mavrogiannis, *D. Yuan*, Y. Aloimonos.
   International Conference on Robotics and Automation, ICRA 2024. Paper Code
7. Gluing Neural Networks Symbolically Through Hyperdimensional Computing.
   P. Sutor, *D. Yuan*, D. Summer-Stay, C. Fermüller, Y. Aloimonos.
   International Joint Conference on Neural Networks, IJCNN 2022. Paper Code
8. Brain-Inspired Hyperdimensional Computing for Ultra-Efficient Edge AI.
   H. Amrouch, M. Imani, X. Jiao, Y. Aloimonos, C. Fermüller, *D. Yuan*, and other four authors.
   2022 International Conference on Hardware/Software Codesign and System Synthesis. Paper

Publication — as a Research Assistant at HKUST.

As the second author of these papers, I processed geographic data > 100 GB, trained models using parallel computing, and generated all the geographic figures.

9. Global PM2.5 Prediction and Associated Mortality to 2100 under Different Climate Change Scenarios.
   W. Chen, X. Lu, *D. Yuan*, Y. Chen, Z. Li, Y. Huang, T. Fung, H. Sun, JCH. Fung
   Environmental Science and Technology (I.F. 11.4) Paper
10. Development of an Integrated Machine-Learning and Data Assimilation Framework for NOx Emission Inversion.
    Y. Chen, JCH. Fung, *D. Yuan*, W. Chen, T. Fung, X. Lu
    Science of Total Environment (I.F. 10.8) Paper
11. Development of an LSTM Broadcasting Deep-learning Framework for Regional Air Pollution Forecast Improvement.
    H. Sun, JCH. Fung, Y. Chen, Z. Li, *D. Yuan*, W. Chen, X. Lu
    Geoscientific Model Development Discussions (I.F. 6.9) Paper
12. Estimation and Variation Analysis of Secondary Inorganic Aerosols Across the Greater Bay Area in 2005 and 2015.
    Y. Chen, *D. Yuan*, W. Chen, M. Hu, JCH. Fung, H. Sun, X. Lu
    Chemosphere (I.F. 13.3) Paper
13. Impacts of Urbanization and Long-Term Meteorological Variations on Global PM2. 5 and its Associated Health Burden.
    X. Lu, *D. Yuan*, Y. Chen, JCH. Fung
    Environmental Pollution (I.F. 8.9) Paper
14. Estimations of Long-Term nss-SO_4^{2-} and NO_3^- Wet Depositions over East Asia by Use of Ensemble Machine-Learning Method.
    X. Lu, *D. Yuan*, JCH. Fung, W. Li, AKH. Lau
    Environmental Science and Technology (I.F. 11.4) Paper
15. Estimation and Spatiotemporal Analysis of NO2 Pollution in East Asia During 2001–2016.
    M. Hu, Y. Chen, *D. Yuan*, R. Yu, X. Lu, JCH. Fung, W. Chen, Y. Huang, AKH. Lau
    Journal of Geophysical Research: Atmospheres (I.F. 4.4) Paper

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Internship Experience

Applied Research Intern. Jun. 3, 2024 – Aug. 23, 2024
Capital One, McLean VA.

Data Scientist Intern. Jun. 5, 2023 – Aug. 18, 2023
Liberty Mutual Insurance, Boston MA.

- Retrieve important activities from raw accident descriptions using **nltk** and **spacy**.
- Perform **clustering**, **association rule mining** on the important activities and visualize the analysis. Clients will know qualitatively and quantitatively how likely an activity will cause an accident and its average cost.
- Design a novel structured-pair representation of the activities, so that clients can easily understand the analysis. Design and implement an interface using **flask** so that clients can browse the analysis interactively.
- The entire pipeline streamlines the analysis of accident causes, which enables our company to enforce targeted safety measurement to different insurance purchasers.

Software Engineer Intern — Jun. 1, 2021 — Aug. 9, 2021

Invest Bots Limited, Hong Kong.

- Crawl and download annual reports (in pdf) using **bs4** and **requests**.
- Design and implement text mining algorithms to locate financial statements (~ 4 pages) from the annual reports (~ 200 pages). The localization accuracy reaches 97%.
- Retrieve tabular data from the financial statements with my novel images-of-table parsing algorithms. This module is used internally and also released at https://table-reader.com.
- The entire pipeline streamlines the downloading and parsing of financial statements, which enables companies to observe market features early.

Mathematical Foundation (Straight A/A+'s / Top 5%)

my handwritten notes

Fundamentals	Honor Calculus Honor Probability Honor Linear Algebra
Analysis	Real Analysis (up to measure theory) Complex Analysis (e.g. Residual Theorem) Theory of ODE (e.g. Poincaré-Bendixson Theorem)
Statistics	Statistical Inference, Regression Analysis, Stochastic Process
Computing	Computational Geometry, Ramsey Theory

Scholarships

- Research Fellowship awarded by Computer Science Department of UMD — $14,000 USD
- Dean's Fellowship awarded by UMD — $2,500 USD
- Scholarship awarded by HKUST — $30,000 HKD=$3,846 USD (Top 5%)
- Scholarship awarded by Fok Yin Tung Research Institute, due to exceptional research productions. — ¥60,000 RMB = $9,500 USD
- The Epsilon Fund Award, due to exceptional performance in honor math courses. — $3,000 HKD=$385 USD (Top 5%)
- Outstanding academic achievement in mathematics. — $30,000 HKD=$3,846 USD (Top 3%)

Others

- Teaching Assistant for CMSC320 Introduction to Data Science for 3 semesters.
- Reviewer for CVPR, ICLR, ICML, NIPS, AAAI.