Hanyu Chen

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Education

Cornell University — Aug 2024 – Present
Ph.D. in Computer Science

- Advised by Prof. Noah Snavely

Carnegie Mellon University
M.S. in Computer Science (QPA 4.08/4.3) — Jun 2023 – Jun 2024

- Advised by Prof. Ioannis Gkioulekas

B.S. in Computer Science (QPA 3.94/4.0) — Sep 2019 – Jun 2023

- Additional major in Mathematics & minor in Computer Graphics

Publications

[1] **3D reconstruction with fast dipole sums** (project link)
Hanyu Chen, Bailey Miller, and Ioannis Gkioulekas
ACM Transactions on Graphics (SIGGRAPH Asia), 2024

- Proposed a novel point-based representation, the dipole sum, to interpolate geometry and appearance features for 3D reconstruction from multi-view images. Built a neural rendering pipeline in PyTorch and implemented custom C++ and CUDA kernels for efficient, differentiable dipole sum queries.

[2] **Objects as volumes: A stochastic geometry view of opaque solids** (project link)
Bailey Miller, **Hanyu Chen**, Alice Lai, and Ioannis Gkioulekas
IEEE/CVF Conference on Computer Vision and Pattern Recognition, 2024
(best student paper honorable mention)

- Developed a theory for the representation of opaque solids as volumes and derived expressions for the volumetric attenuation coefficient. Demonstrated reciprocity by rendering path-traced and light-traced image pairs; generalized model to render point clouds by leveraging the output of stochastic Poisson surface reconstruction.

Job Experience

Software Engineer Intern — Jun 2022 – Aug 2022
Map Engine Team, Nvidia — Santa Clara, CA (Remote)

- Built automated tool to filter and download road images from server. Analyzed issue logs from map review pipeline to create a dataset of approximately 180k valid and 10k invalid images with misalignment and calibration issues.
- Trained an image classification model based on the ResNet-34 architecture to detect invalid road images with a high recall rate, aiming to reduce workload for manual review.

Algorithm Engineer Intern — Jun 2021 – Aug 2021
WLAN Team, Huawei — Beijing, China

- Simulated a 5GHz wireless network with approximately 150 access points in an office building environment.
- Implemented bipartite matching and greedy depth-first search algorithms for dynamic channel allocation in Python, lowering total interference by over 70% while ensure 40MHz bandwidth for each access point.

Teaching Experience

Computer Graphics Practicum — Aug 2024 – Present
Teaching Assistant — Cornell University

Physics-based Rendering — Jan 2023 – May 2023
Teaching Assistant — Carnegie Mellon University

Algebraic Structures — Aug 2022 – Dec 2022
Grader — Carnegie Mellon University

Course Projects

Adaptive LiDAR sampling based on free-flight uncertainty
Nov 2023 – Dec 2023
Computational Photography
Carnegie Mellon University

- Developed a novel adaptive LiDAR sampling scheme for scanning objects by progressively placing samples at locations of high uncertainty, characterized by the entropy of the free-flight distribution of randomly sampled rays.

Differentiable rendering for optimizing local scene parameters
Apr 2022 – May 2022
Physics-based Rendering
Carnegie Mellon University

- Implemented a path-tracing based renderer in C++ to compute gradients of a rendered image with respect to local scene parameters. Optimized material properties and lighting to match target images using gradient descent.

CUDA-Based Bag-of-Words scene recognition
Apr 2022 – May 2022
Parallel Computer Architecture and Programming
Carnegie Mellon University

- Parallelized convolution, extraction, and clustering stages of a bag-of-words classification algorithm in C++ and CUDA, resulting in a 50x speedup over a sequential algorithm, and an 8x speedup over a baseline OpenMP implementation.

Animating Hand-drawn Sketches Using Image Autoencoders
Oct 2021 – Dec 2021
Visual Learning and Recognition
Carnegie Mellon University

- Implemented a CNN-based autoencoder with an auxiliary discriminator network to animate hand-drawn sketches by interpolating between latent vectors and reconstructing keyframes.

Relevant Coursework

Graphics & Vision
Computer Graphics, Discrete Differential Geometry, Physics-Based Rendering, Computational Photography, Computer Vision, Visual Learning & Recognition

Machine Learning
Machine Learning, Convex Optimization, Deep Learning, Graduate Artificial Intelligence

Theoretical Computer Science
Algorithm Design & Analysis, CS Theory Toolkit, Advanced Algorithms

Mathematics
Probability, Markov Chains & Mixing Times, Monte Carlo Methods & Applications

Poster Presentation

How do you render a probability?
12/2022
Undergraduate Research Symposium
Carnegie Mellon University

Skills

Languages: C, C++, Python, Standard ML
Frameworks/Libraries: PyTorch, OpenCV, Open3D, NumPy, Eigen, CUDA, OpenMP, Git
Tools/Software: Colmap, MeshLab, Blender, Unreal Engine, LaTeX