Yong CHENG

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EDUCATION

George Mason University   Fairfax, VA, US
- Computer Science, Ph.D.   2025 – present
- TA for CS262 Introduction to Low-Level Programming

Washington University in St. Louis   St. Louis, MO, US
- Computer Science, M.S.   2021 - 2023
- Overall GPA 3.9/4.0
- TA for CSE 332/504 Object-Oriented Software Development Laboratory

Shanghai Ocean University   Shanghai, China
- (Mathematics) Information and Computing Science, B.S.   2016 - 2021
- Major GPA 3.9/4.0 (1st / 58)   Overall GPA 3.5/4.0

SKILLS & INTERESTS

Programming   C/C++, Python, Mathematica, JavaScript, Html, CSS, C#, SQL, MATLAB, Git
Software & OS   Unity, AutoCAD, QGIS, Photoshop, MacOS/Linux/Windows
Academic Interests   Computer Graphics (Geometry Processing, AI-based, etc.)

WORK EXPERIENCE

NIO Inc.   Shanghai, China
Algorithm Engineer | High-Definition (HD) map, Autonomous Driving, C++   May 2024 - present
- **Map Data Auto-Generation:** Analyzed and implemented algorithms from academic papers to compute map data matching relationships, ensuring adherence to industrial standards. Utilized matching relationships between data sources to merge disparate datasets, streamlining HD map auto-generation processes.
- **Intersection Range Identification:** Designed and developed an algorithm for the automatic detection of intersection ranges, significantly reducing short link issues, redundancy, and road disconnections.

International Digital Economy Academy (IDEA)   Shanghai, China
Software Engineer, Geometry and Graphics Algorithms | CAD/CAE, BIM, C++   Jun. 2023 - Mar. 2024
- Implemented a skeletonization algorithm for automatic generation of roofs.
- Developed infrastructure libraries: curve and surface discretization, bounding box computation, quartic equation solver, and Quadtree implementation.
- Enhanced the loop search algorithm with caching and Quadtree integration, gaining over 100× speedup, and rewrote the "loop to face" algorithm for a 1000× performance boost.
- Designed and implemented efficient analytic intersection algorithms for a line with a cylinder, a cone, and a torus, ensuring high-speed computation with distance tolerance considerations.
- Implemented a general geometric intersection algorithm to solve complex curve and surface intersection problems, whose precision surpasses industry standards like Parasolid even in extreme scenarios.

Elekta Inc.   St. Louis, MO
Software Engineering Intern | Medical Image Management, JavaScript, Node.js   May 2022 - Aug. 2022
- Developed a web-based software for managing DICOM files in radiation therapy. Enhanced software capabilities by adding visualization, parsing, recursive indexing, querying, and file upload/download functionalities. Integrated a database and blob storage.

RESEARCH & PROJECT EXPERIENCE

Inheritance analysis based on 3D skeletonization | Mathematica, Python
Guided by Professor Tao Ju, Washington University in St. Louis

St. Louis, MO
Dec. 2022 - May 2023

- **Feature Extraction:** Analyzed 3D spatial density data of chromosomes and extracted skeletal features such as chromosome length, inter-chromosomal angles, and dimensions along three PCA directions.
- **Threshold Optimization:** Computed skeletal topological change curves for each sample across different density thresholds, by which I implemented an algorithm to automatically determine the optimal thresholds for binarization and skeletonization.
- **Dimensional Reduction & Data Analysis:** Calculated over 50 features from each sample's skeleton, performed dimensionality reduction methods (PCA, UMAP, and LDA), and identified patterns and trends to locate affected genes.

Enhanced Microtubule Segmentation and Tracking | Python, Napari
Final Project of CSE 554: Geometric Computing for Biomedicine

St. Louis, MO
Nov. 2022

- Developed a tool for biologists to track microtubule segmentations across frames based on initial positions.
- Applied image blurring and Contrast Limited Adaptive Histogram Equalization (CLAHE) for global contrast adjustment. Designed algorithms for generating accurate binary images with dynamic thresholds, surpassing OpenCV's built-in functions.
- Used opening, closing, and Hough transformation techniques, and created a custom loss function to locate target microtubules, addressing challenges like stretching, shrinking, movement, rotation, and crossing.

Geometry Processing Algorithm Implementation | Mathematica
CSE 554: Geometric Computing for Biomedicine
Implemented geometric algorithms and **all** advanced extra parts. Including:

St. Louis, MO
Aug. 2022 - Nov. 2022

- 3D Skeletonization, Isosurface Extraction, Surface Simplification with QEM, PCA/SVD Registration, and Laplacian non-rigid body deformation.
- **Extra parts:** Isosurface extraction by 2 different methods, Marching Cubes and Dual Contouring, then implemented Interval Tree to accelerate the algorithm. Implemented QEM in both 2D and 3D. Enhanced Laplacian-Deformation by optimizing a transform matrix to generate a better shape.

Pedagogical Applet of Chan's Algorithm | Html/CSS, JavaScript, Vue

Dec. 2021

- Developed a demo website to show the process of the world's fastest convex hull algorithm, Chan's algorithm with complexity of o(n log h) (h stands for output size) after the course Computational Geometry.

Mathematical Contest in Modeling (CUMCM) | MATLAB

Sept. 2019

- Analyzed ball-bouncing strategies on a drum under varying conditions of angles, forces, and frequencies. Proposed a model mainly based on mechanics and space coordinates. Authored a thesis that won the national 2nd prize.

AWARDS & HONORS

Contemporary Undergraduate Mathematical Contest in Modelling
The National 2nd Prize, Ranking: top 3.8%

Sept. 2019

The People's Scholarship in China
The 1st Prize, Ranking: top 5%

2018 & 2019 & 2020