Youheng Zhu

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EDUCATION

Huazhong University of Science and Technology, Wuhan, China
Major: Computer Science and Technology Cumulative GPA: 4.57/5.00 ; Top 7%

RESEARCH EXPERIENCE

Real-time Ray-Tracing and Many Lights Problem Wuhan, China
Research Intern, Huazhong University of Science and Technology Mar. 2022 — Dec. 2022

- Explored the use of stochastic lightcut and spatial-temporal reuse of light-tree nodes to accelerate real-time global illumination.
- Helped use Falcor, a real-time rendering framework provided by NVIDIA, to implement the experiments.
- Explored the method of spatial-temporal reuse in real-time bidirectional ray-tracing.

Simulating Blood Stream Using Lattice Boltzmann Method Wuhan, China
Team Member, Huazhong University of Science and Technology, Research group of Baocang Shi Jan. 2023 — Oct. 2023

- Designed simple models to characterize blood stream in a vessel, models include both 2D and 3D versions.
- Implemented the LBM using C++, numerically solve the Navier-Stokes equation that characterizes the blood stream in our model.

Exploring Generalization Error of the Gibbs Algorithm via Information Neural Estimator Wuhan, China
Research Project Leader (Remote), University of Florida, Research group of Yuheng Bu July 2023 — Dec. 2023

- Used MALA (a type of MCMC) to sample from Gibbs algorithm on random feature model.
- Developed a Symmetrized-KL divergence neural estimator to explore the information measure generalization error bound of the learning problem.

Theoretical Analysis of Generalization Error Bound for Gibbs Algorithm Wuhan, China
Research Intern (Remote), University of Florida, supervised by Yuheng Bu Dec. 2023 — Now

- Designing conditionally tight information measure bound for Gibbs algorithm. (Proceeding)

SELECTED PROJECTS

- **Sudoku Generator and Solver Based on Solving SAT Problem**
  Implementation of a solver for arbitrary SAT problem with formatted input using C++. Transfer a Sudoku problem into an SAT problem, and use the solver to generate a Sudoku with single solution or simply solve a given Sudoku problem.
- **Ada-boost Model Based on Decision Stump and Logistic Regression**
  Used Decision Stump and Logistic Regression as base classifier to implement an Ada-boost classifier. Implemented from scratch using python.
- **Five-stage Pipeline RISC-V CPU Design**
  Used Logisim to design a Five-stage pipeline RISC-V CPU which supports multi-level interrupt. Based on the complete CPU that was designed, a simple I/O mechanism was realized using interrupt and a playable mini game was accomplished.
- **Cyber-Punk HD-2D Rendering Style Rhythm Game**
  A game made as a team with unity, with shader design and particle system to achieve a HD-2D effect.

AWARDS

Bronze Medal at Chinese Physics Olympiad (CPhO), Final. Rank 5 in Guangdong Province at semi-final 2020
Merit Student, Huazhong University of Science and Technology. Top 5% 2022
Scholarship for Academic Excellence, Huazhong University of Science and Technology. 2023

SKILLS

- **Programming:** C/C++, C#, Python, OpenMP, MPI, OpenGL, DirectX12, MySQL
- **Software:** Unity, Logisim
- **Maths:** Real Analysis, Abstract Algebra, Probability Theory (Based on Measure), Stochastic Process, Basic Measure Theory, Information Theory, Functional Analysis, Sobolev Spaces and Generalized Function (still learning), and high motivation for more maths (especially analysis).