Qiu-han Gu

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Education

University of Illinois Urbana-Champaign **Aug.2024 – Present**
Master Science of Computer Science, *Advisor: Prof. Lingming Zhang* *Illinois, United States*

Nanjing University **Sept.2020 – Jun.2024**
Bachelor of Science in Computer Science and Technology, *Advisor: Prof. Linzhang Wang* *Nanjing, China*

Research Interests

The intersection of Software Engineering and Machine Learning, especially in the area of the testing of Large Language Models and Programming Languages.

Publication

LLM-Based Code Generation Method for Golang Compiler Testing **[PDF]**
Independent First Author ESEC/FSE Conference 2023

Research Experiences

LLM-Based Code Classification Method **Feb.2024 – Jun.2024**
Programming Language Testing, 2-person team, supervisor: Prof. Yu Wang *SEG in Nanjing University*

- Implemented an LLM-based high-quality code classification method of Go language, achieving an accuracy of 96.4%.
- Combine large language models and traditional methods to efficiently model code in terms of lexical, syntactic, and semantic aspects.
- Defined custom classification categories, providing fine datasets for downstream tasks.

LLM-Based Code Generation Method for Golang Compiler Testing **Sept.2022 – Dec.2023**
Compiler Testing, 2-person team, supervisor: Prof. Yu Wang *SEG in Nanjing University*

- Implemented an LLM-based high-quality code generation method to the Golang compiler, generating testcases with 3.38% average coverage and only 2.79% of them had syntax errors.
- Published a paper as the independent first author at ESEC/FSE Conference 2023, LLM-Based Code Generation Method for Golang Compiler Testing.
- Won 1st prize in the undergraduate division of ESEC/FSE'23 Student Research Competition.
- Kept on exploring the software testing technique and improving the performance of program analysis by machine learning.

Content-Adapted Image Super-resolution Based on Random Scale **May.2023 – August.2023**
Image Super-resolution, 3-person team, supervisor: Prof. Jie Guo *MCG in Nanjing University*

- Devised a novel comprehensive scheme based on the self-attention mechanism to integrate scene adaptation, resolution adaptation and content adaptation to boost the efficiency and robustness of image super-resolution.
- Developed the study around the neural network and realize the image super-resolution based on random scale with kernel prediction.
- Spark the keen interest to conduct a more in-depth study in the field of image rendering and image super-resolution.

Automatic Detection of Intracranial Aneurysms Based on Deep Learning **May.2022 – Apr.2023**
Object Detection, 8-person team, First prize in the national competition (1/154) *Nanjing University*

- Utilized Python and PyTorch to perform a clinically applicable deep-learning model for detecting intracranial aneurysm in computed tomography angiography images.
- Set an online website for medical institutions to apply the model conveniently.
- Focused on back-end development and improved the manipulation of Java web.
- Designed a complete business plan for project implementation.

Projects Experiences

A Physically Based Renderer using Monte Carlo Path Tracing [repo] **Mar.2022 – June.2022**
Rendering, Independent project *Nanjing University*

- Realized the Monte Carlo Path Tracing algorithm based on C++, establishing an "easy to deploy and develop" rendering platform.
- Realized BVH, Octree accelerator, multiple importance sampling, Gaussian filtering and bilateral filtering, and integrated Intel Open Image Denoise.

Drawing System [repo] **Dec.2021 – Mar.2022**
Computer Graphics, Independent project *Nanjing University*

- Utilized Python to create a simple interactive drawing system.
- Realized basic graphics algorithms, including the drawing of line, Bezier curve and B-spline curve, cutting of two-dimensional graphics and transformation of two-dimensional graphics.

Program Equivalence Verification Tool [repo] **Sept.2021 – Nov.2021**
Software Development, Programming Language, Independent project *Nanjing University*

- Utilized C++ to realize an interactive tool that can automatically judge whether two programs are equivalent.
- Utilized unit testing and performance testing to thoroughly test the tool before launch it.

Teaching Experiences

- University of Illinois Urbana-Champaign: CS427 Software Engineering, 2024 Fall
- Nanjing University: Advanced C++ Programming, 2024 Spring
- Nanjing University: Python Programming, 2024 Spring
- Nanjing University: Python Programming, 2023 Fall

Skills

Languages: C/C++, Python, Java, JavaScript, Go, SQL, HTML
Tools: Linux, Git, Docker, Pytorch, Tensorflow, Anaconda, Maven, JUnit, MySQL, MangoDB

Honors & Awards

- 1st Prize, Undergraduate Division, ESEC/FSE'23 Student Research Competition, Dec.2023
- Huawei Scholarship, Oct.2023($< 10\%$)
- 1st Prize, National College Student Entrepreneurship Competition, Mar.2023(10%)
- National Scholarship of Undergraduate, Dec.2021($< 1\%$)