Yunkai Zhang

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Profile

Second year Computing student with experience in systems programming, data analysis, and competitive programming. Skilled in several coding languages and tools and learnt algorithmic nature and mathematical foundations of coding. Keen to develop my knowledge on theoretical computer science, programming languages with software engineering, computer systems and other related fields.

Education

- **Imperial College London** — London, UK
  Master of Engineering (4-year MEng) in Computing — *2022 – 2026 (expected)*
  - **Honours**: First Class Honours in Year 1, Awarded 2022-23 Computing Entrance Scholarship
  - **2nd Year Modules**: Algorithm Design and Analysis, Software Engineering Design, Operating Systems, Models of Computation, Compilers, Probability and Statistics, Networks and Communications, Symbolic Reasoning, Laboratory (Group Projects)
- **David Game College** — London, UK
  GCE A Levels — *2020 – 2022*
  - **A Level Results**: Computer Science (A*), Further Mathematics (A*), Mathematics (A*), Physics (A*)
  - **Other**: Grade S in STEP II, Student Peer Mentor for Mathematics and Computer Science, Academic Scholarship, Team Leader in School Coding & Robotics Club, leading the Raspberry Pi experimental project series.

Experience

- **WACC Compiler (Ongoing)** — Leader in Group Project
  A Compiler for a Custom Language "WACC" — *January - March 2024*
  - Crafting a compiler in Rust with syntax and semantic analyzer, along with a further assembly code generator and emulator. Generating error messages with Rust-style reporting and spanning.
  - Improved `Chumsky`, a public parser combinator library's Pratt parsing algorithm to support multiple precedence levels. Incorporated the complete Pratt parsing in the original paper instead of the simplified version.
- **PintOS** — Leader in Group Project
  A Mini Operating System Implementation in C — *October - December 2023*
  - Dived into the principles of operating systems and constructed the higher-level framework of expected functionalities to deliver for the whole team.
  - Realizing the mini operating system that supports multi-threading with proper synchronization features, user program loading and execution (including interactions with the file system), and virtual memory implementation. Gone through extensive debugging and simulating processes to understand the detailed behaviours of the system.
- **ARMv8 AArch64 Assembler and Emulator** — Group Project
  Implementation in C with Applications of Raspberry Pi — *May - June 2023*
  - Implemented an integrated emulator-assembler system for a subset of the A64 RISC architecture (64-bit execution mode of the ARMv8-A Architecture) in C, which could translate an AArch64 assembly source file containing A64 instructions into a binary file and then simulate its executions, with the functionality of parsing comments.
  - Wrote an assembler program to interact with Physical Device of Raspberry Pi to interact with its registers and peripherals, on a low-level operating system perspective.
  - Led group-wise coordination on final presentation and reports.
- **AI-Based Face Centering Portrait Photo Editor** — Individual Project
  with Applications of OpenCV and NumPy — *September 2021 - May 2022*

- Combined a facial landmark localization method with OpenCV to provide a face-specialized photo editing service with GUI that is specifically designed for portrait photographs.
- Utilised Object-Oriented Approach on the separated facial effects and supported multiple editing services, including using kernel units to apply Gaussian Blurring, Skin Tone Colour Adjustment, Skin Smoothing, Sharpening, Lip Colouring, and Face Contour Modifications via image warping translation algorithm.
- Supporting further customization including file system interactions to enable multi-format imports and exports, sliders for quantitative control, target selection under a multi-faced scenario.

- **Computational Social Network Analysis on Twitter** Team Leader in Group Project
  focusing on Tweets during selected time periods *January - October 2021*
  - Led and organised tutorials in graphical algorithms and network study techniques for other members
  - Investigated Twitter feeds in the 2020 Christmas Week of over 1500000 tweets in total for the bulk project
  - Developed a named-entity recognition system and supported real-time selection based on Twitter API, able to fetch tweets and generate word cloud and pick the most popular named entities (celebrities, cities, etc.) or specified users and hashtags during selected time periods.
  - Generated cluster interactive network data for the exported tweets, conducted network analysis on the connection, distribution, and betweenness centrality of the social network.
  - Applied Natural Language Processing and Sentiment Analysis Techniques to give a basic semantic analysis of Tweets and an overview of public interests and judgements on customised topics and entities.

- **Competitive Programming** Society Leader & Participant
  for Olympics and UKIEPC *2017 - Present*
  - **UKIEPC**: Participated in Both 2022 and 2023 Challenges, Silver Awards
  - **Awards in (CN) National Olympics in Informatics**: Provincial First Award for National Olympics in Informatics in Provinces; Second Class Honour in Certified Software Professional for Senior Students
  - **Algorithm Workshops**: Chaired weekly meetings focusing on algorithms and data structures, delivered tutorials covering various computing and higher level mathematics topics for peer students
  - **External Activities**: Collaborated with team members and participated in online ACM challenges with University Students. Ranked top10% in August 2020 challenges in local area.

- **Event Study in Fluctuations of Foreign Exchange Market during BREXIT** Individual Project
  Analysis in Econometrics with Python *May - July 2021*
  - Conducted an event study for econometrics behaviours on the foreign exchange market, using time series analysis and regression methods to find out the abnormal volatility of exchange rates during BREXIT.
  - Visualized statistical results of regression results in multiple models, graphing return evaluation, time series, and estimated curves in Python and R.
  - Compared behaviours of multiple currencies in a selection of different window periods to reflect the volatility of the foreign exchange markets and extent of influence on a global scale, listed by regions in high-level and countries in low-level.

Skills and Interests

- **Programming Languages and Tools**: Python, C, C++, Haskell, SQL, Java, Kotlin, Pascal, C#, Rust, Z3 Solver(in Z3Py), Coq, Tensorflow, Raspberry Pi, Docker, gdb
- **Natural Languages**: English (Native/Bilingual), Mandarin Chinese (Native/Bilingual), Japanese (Beginner)
- **Other Materials I'm Studying Beyond Curriculum**: Mathematical Analysis, Lambda Calculus and Type Systems, Abstract Algebra, Category Theory
- **Other Personal Interests**: Anime, VR Gaming, Theatrical Arts, Musicals, Trailing