





ZHANYUAN TIAN

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 [Zhanyuan Tian \(no-strum.github.io\)](https://no-strum.github.io)

EDUCATION

Wuhan University

Hubei, China

Bachelor of Engineering – School of Remote Sensing Information Engineering

September 2020 – June 2024

GPA: 3.93/4 92.90/100 (TOP 2%) TOEFL: 105 GRE: 330

COURSEWORK: Advanced Mathematics(98), Linear Algebra(92), Probability and Mathematical Statistics(96), Mathematical Physics(100), Principles of Computer Science and Programming(92), Object-Oriented Programming(94), Data Structures/Algorithms(94), Computer Network and Application(87), Network Programming with Java(85), Principles and Applications of Database(92), Digital Image Processing(87), Artificial Intelligence(87), Computer Vision and Pattern Recognition(92)

HONORS: National Scholarship (**TOP 0.5%**, September 2023)

NITORI Fellowship (September 2022)

Haida Zhong Fellowship (September 2021)

Distinction Student of Wuhan University (November 2021, November 2022, November 2023)

Excellent Class Secretary of Wuhan University (July 2023)

AWARDS & RECOGNITIONS

- Second Prize, National Innovation and Entrepreneurship Program August 2023
- First Prize, National College Student Mathematical Modeling Competition November 2022
- Second Place, Red Maple Debate Competition March 2022
- First Prize, National Mathematics Competition December 2021

RESEARCH EXPERIENCE

China Society for Industrial and Applied Mathematics

Hubei, China

Team Leader; Programmer

April 2022 – September 2022

- Served as the sole programmer and Team Leader of three, constructing the cost & profit model of each cargo ship on the Yangtze River through investigation, used dynamic programming to calculate the ideal cargo routes of each cargo ship, and found the Nash equilibrium of the game between the ships to calculate their optimal sailing routes. ([Report Page](#))
- Established five-element, second-order differential equation characterizing the kinematics of a wave energy extraction device by conducting rotational and translational analyses of the floats and vibrators and solving it using reduced order treatment and Runge-Kutta method. Optimized damping coefficients using differential evolution algorithm to maximize average power output of the device to 351.190W. ([Report Page](#))
- Simulated the form of a mooring chain in water by building a physical model accounting for wind and current forces while optimizing anchor chain types using Pareto approximation for proper system operation. ([Report Page](#))
- Contributed to a study that compressed AIS route data in cargo ships by 57.9% with the Douglas algorithm, and forecasted the number of ships passing through the Yangtze River based on vector fork product method and Time Series Analysis. ([Report Page](#))
- Developed random decision forests to identify a significant molecular descriptor set, denoted as Ω . Employed neural networks to model the relationship between Ω and drug activity and safety. Utilized genetic algorithms to pinpoint the most safety-compliant active drug. ([Report Page](#))
- Conducted an in-depth analysis of the Wordle game's question-answering data. Established a model to assess Wordle's question-answering accuracy by employing statistical tools such as the Shapiro-Wilk normality test and variance alignment test. Obtained model parameters through nonlinear regression. ([Report Page](#))
- Tools: MATLAB SPSS Latex Python(SciPy)

CVRS Lab

Hubei, China

Researcher

May 2023 – Present

Technical Project: Depth-Prior MVSNet Network

- Optimized the network structure of Casmvsnet by employing a transformer for both intra- and inter-image feature fusion, leveraging the depth information from the previous stage to restrict the fused region in subsequent stages.
- Improved Cost Volume accuracy by implementing Bayesian estimation: leveraged negative exponential powers of feature differences for likelihoods, utilized depth from previous stages as prior probability, and employed 3D convolution for patch-based probability fusion after determining the depth posterior estimate for individual pixels.

- Utilized KL divergence between the ground truth depth (represented as a single peak) and the estimated depth distribution as the loss function to constrain the shape of depth probability curve for each pixel, transforming the optimal depth estimation into a convex optimization problem. This enhancement increased the likelihood of network convergence.
- Outperformed other contemporary research studies and models during that period by achieving a result of **0.339** accuracy and **0.274** completeness metrics on DTU, indicating high levels of data accuracy and reliability.
- More information about this project can be found on my [homepage](#).
- Tools: Python Pytorch Git

Technical Project: SuperlightGlue Network

- Reconfigured the output layers of SuperPoint network into a U-Net architecture, enabling simultaneous multi-scale descriptor extraction and matching ground truth calculations for each point.
- Augmented the SuperGlue network's efficacy with a pioneering coarse-to-fine aggregating technique that employed random sampling across three iterations. This method utilized transformers to merge multi-scale features of each point, identified high-confidence matches, and established them as prior information.
- Reduced runtime and GPU memory consumption on dense detection (**30.7%** and **12.0%** respectively) by limiting the attention aggregation range to the closest 10 well-matched point pairs while continuously iterating to obtain the final matching result.
- Tools: Python Pytorch Git

Assistant Developer

- Partnered with Huawei to develop a demonstration application, designed to fuse over 200 images from an iPad RGB-D camera into high-precision point clouds, utilizing open3D capabilities.
- Contributed to the enhancement of image fusion techniques by engineering the essential functionalities, including the implementation of homography transformation in the depth completion neural network [PatchMvsnet](#).
- Evaluated the performance of established techniques, including Markov chain and bilateral filtering, for depth completion assignments, providing a comprehensive assessment of their strengths and limitations.
- Tools: Python(Open3d) MATLAB JavaScript

State Key Laboratory of Remote Sensing

Hubei, China

Project Leader

September 2022 – June 2023

- Led a team of four in collecting 5.5km of road point cloud and image data, applying CSF(Cloth Simulation Filtering) for ground point cloud extraction, and constructing a road network model with the PTD (Progressive-densification-based filters) algorithm.
- Optimized remote sensing data in ground point clouds by augmenting information density using edge detection, elevating data quality through the removal of low-intensity points and attaining a **90%** accuracy rate in road text recognition utilizing PaddleOCR and Densenet.
- Designed P2PRN network--Utilized the backbone of MPR-GAN for 2D-feature generation and SuperGlue for 2D-feature matching to optimize point rendering perspective based on matches, completing multi-modal matching tasks after several iterations and successfully calculating road camera position with **$\pm 5^\circ$ and $\pm 2.5\text{m}$** accuracy.
- More information about this project can be found on my [homepage](#).
- Tools: C/C++ Python

TECHNICAL SKILLS

- PROGRAMMING LANGUAGE: C/C++, Python, Java, JavaScript, R
- DEVELOPER TOOLS: Visual Studio, Vs Code, MATLAB, IntelliJ IDEA, PyCharm, SPSS, Lingo
- TECHNOLOGIES/Frameworks: Linux, Git, Pytorch, SciPy, OpenGL, Open3d
- OTHER: MySQL, Latex, Bash, HTML/CSS