ZHANYUAN TIAN

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EDUCATION

Wuhan University   **Hubei, China**
Bachelor of Engineering – Remote Sensing   September 2020 – June 2024
GPA: 3.92   92.90 (TOP 2%)   TOEFL: 105   GRE: 330
COURSEWORK: Data Structures/Algorithms. Database, Artificial Intelligence, Linear Algebra, Statistics/Probability
HONORS: Haida Zhong Fellowship (September 2021) NITORI Fellowship (November 2022)

AWARDS & RECOGNITIONS

- Excellent Class Secretary of Wuhan University   July 2023
- Distinction Student of Wuhan University   December 2022
- First Prize, National College Student Mathematical Modeling Competition   November 2022
- Second Place, Red Maple Debate Competition   March 2022
- Distinction Student of Wuhan University   December 2021
- First Prize, National College Student Mathematics Competition   December 2021
- Second Prize, National College Student Innovation and Entrepreneurship Program   April 2021

WORK EXPERIENCE

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 enhance the fused region in subsequent stages.
- Improved Cost Volume accuracy by implementing Bayesian estimation techniques: leveraged negative exponential powers of feature differences for likelihoods, utilized prior Cost Volume from previous stages, and employed 3D convolution for patch-based probability fusion after determining the depth posterior estimate for individual pixels.
- Utilized KL divergence to ensure a singular peak in the 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 gaining a result of **0.339** accuracy and **0.274** completeness metrics on DTU, indicating high levels of data accuracy and reliability.
- 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 a major global technology firm 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 for a depth completion neural network.
- 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 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.
- Utilized MPR-GAN for image generation and SuperGlue for 2D image-level matching to optimize point rendering angles based on matches, completing multi-modal matching tasks and successfully calculating road camera position with **±10°** and **±15m** accuracy.
- Tools: C/C++ Python

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, contributing to a study that forecasted the number of ships passing through the Yangtze River based on a comprehensive time-series model.
- Accurately predicted the cargo ships' algorithm by compressing AIS route data in cargo ships by 57.9% with the Douglas-Peucker algorithm while calculating ship passage times via the vector fork product method.
- Developed a cost & profit model for 24 Yangtze River cargo ships, by calculating the ideal cargo routes of each cargo ship and mapping optimal sailing routes via Nash equilibrium through a ship navigation game.
- Simulated the form of a mooring chain in water by building a mooring system model accounting for wind and current forces while optimizing anchor chain type, segments, and weight ball mass using Pareto approximation for proper system operation.
- Maximized the power of wave energy by developing equations for wave energy extraction floats, enabling the calculation of optimal damping coefficients for two linear and two rotary dampers, saving cargo ships a significant amount of fuel.
- Tools: Matlab SPSS Latex Python(Scipy)

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