

Ran Zhu (朱然)

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RESEARCH INTERESTS

- Self-driving related research topics
- Visual Simultaneous Localization and Mapping (V-SLAM)
- Pedestrian indoor positioning

EDUCATION

University of Electronic Science and Technology of China (UESTC)

Chengdu, China

M.Eng. in Communication and Information System | Major GPA: 3.70 / 4.00

Expected in July 2021

- Rank 1st in the same-year group (1 / 287)
- Thesis: *Research on Location Algorithm Based on Multi-information Fusion*
- Advisor: Prof. Zhuoling Xiao

Jilin University (JLU)

Changchun, China

B.Eng. in Communication Engineering | GPA: 3.54 / 4.00 (Top 10%)

Sep 2014 – Jun 2018

- Recommended for admission to be a graduate student
- Thesis: *Human Activity Recognition Based on Neural Network*
- Advisor: Prof. Zhuoling Xiao and Prof. Yuhong Zhu

RESEARCH EXPERIENCE

Efficient Human Activity Recognition via Deep Ensemble Learning

Mar 2018 – May 2019

- Designed a novel learning-based ensemble algorithm based on Tensorflow to classify the confusing activities;
- Collected a huge amount of motion data (7 motion modes under 4 smartphone placements) including 100 participants aging from 12 to 51 under different collection platforms (IOS and Android);
- Improved the classification accuracy to 96.11% and proved the effectiveness of the proposed model;
- Project papers were accepted by IEEE ACCESS in 2019 and IEEE DSP 2018.

Adaptive Zero Velocity Detection for ZUPT-Aided Pedestrian Navigation System

Sep 2019 – May 2020

- Proposed an adaptive Zero Velocity Detection algorithm based on the symmetrical framework by leveraging deep Recurrent Convolutional Neural Networks (RCNNs) for ZUPT-based INS system;
- Collected and calibrated 87 trajectories from 27 participants in various indoor and outdoor scenes using foot-mounted IMU devices;
- Outperformed competing methods in terms of tracking accuracy and robustness under different motion modes and individuals;
- Project paper is under review by IEEE Sensors Journal.

A Loop Closure Detection Method using Adaptive Weighted Similarity Matrix

Oct 2019 – Aug 2020

- Proposed an adaptive weighted Loop Closure Detection algorithm based on deep learning by jointly optimizing feature extraction module and similarity matrix;
- Outperformed state-of-the-art learning-based methods in terms of precision and recall rate, highlighting its promising generalization ability;
- Project paper is under review by IEEE Sensors Journal.

- Modelled VO problem based on deep learning to solve the traditional SLAM problems such as camera calibration required when employing different devices and monocular scale ambiguity;
- Established on the intuition that features contribute discriminately to different motion patterns, we proposed a novel four-branch network to learn the rotation and translation by leveraging Convolutional Neural Networks (CNNs) to focus on different quadrants of optical flow input;
- Outperformed state-of-the-art monocular methods by a large margin and produced competitive results against the classic stereo VO algorithm on the KITTI and Malaga benchmark datasets;
- Ongoing: build an intelligent robotic system that can more efficiently deal with the traditional SLAM problems by combining traditional methods and deep learning;
- Project paper is under review by IEEE Internet of Things Journal.

PUBLICATIONS

- 1) **Ran Zhu**, Zhuoling Xiao, et al. Efficient Human Activity Recognition Solving the Confusing Activities via Deep Ensemble Learning [J]. IEEE Access, 2019
- 2) **Ran Zhu**, Zhuoling Xiao, et al. "Deep Ensemble Learning for Human Activity Recognition Using Smartphone," *2018 IEEE 23rd International Conference on Digital Signal Processing (DSP)*, Shanghai, China, 2018, pp. 1-5, doi: 10.1109/ICDSP.2018.8631677
- 3) **Ran Zhu**, Mingkun Yang, Wang Liu, Rujun Song, Zhuoling Xiao, Bo Yan. "DeepAVO: Efficient Pose Refining with FeatureDistilling for Deep Visual Odometry", IEEE Internet of Things Journal,2021. (under review)
- 4) Mingkun Yang, **Ran Zhu**, Zhuoling Xiao, Bo Yan. "Symmetrical-Net: Adaptive Zero Velocity Detection for ZUPT-Aided Pedestrian Navigation System.", IEEE Sensors Journal,2021. (under review)
- 5) Ying Li, **Ran Zhu**, Mingkun Yang, Zhuoling Xiao, Bo Yan. "MetricNet: A Loop Closure Detection Method for Appearance Variation using Adaptive Weighted Similarity Matrix.", IEEE Sensors Journal,2021. (under review)

HONOR & SCHOLARSHIP

- **First prize in the national final of the 15th China Graduate Electronics Design Contest (Top 1%)** **2020**
- **Gold award in Sichuan division of China College Student "Internet Plus" Innovation and Entrepreneurship Competition** **2020**
- **UESTC First-class Scholarship × 2** **2019 - 2020**
- **Second prize in the southwest division of the 14th China Graduate Electronics Design Contest** **2019**
- **National Scholarship of China (Top 1%)** **2019**
- **National Scholarship of China (Top 1%)** **2019**
- **UESTC First-class Scholarship for new graduate student** **2018**
- **National Inspirational Scholarship × 3** **2015- 2017**
- **JLU Second-class Scholarship × 4** **2015- 2018**