ZANXI RUAN

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Research Interest

Video Understanding, Event Camera, Few-shot Learning.

Education

National University of Defense Technology, Hunan, China **Sep. 2021 – June 2024**
Master of Management Science and Engineering | Supervisor: Prof. Yingmei Wei
Overall GPA: 3.3/4.0

North China University of Technology, Beijing, China **Sep. 2017 – June 2021**
Bachelor of Digital Media Technology
Overall GPA: 3.85/4.0 **Rank: 1st/70**
Core Courses: Computer Graphics (A), Data Structure (A), Operating System (A), Game Engine Development (A), Multimedia Computing (A), Discrete Mathematics (A).

Honors

The Freshman Second Prize Scholarship of the National University of Defense Technology **2021**

Outstanding Graduates Awards of North China University of Technology (top 1%) **2021**

First Class Academic Scholarship (top 1%) **2019, 2020, 2021**

National Scholarship Candidate **2020, 2021**

Second Prize in the C/C++ Programming Competition (Beijing Division) of the Blue Bridge Cup **2019**

Second Prize in the National College Mathematical Modeling Competition (Beijing Division) **2019**

First Prize in the Graphic Design Category of the Blue Bridge Cup (Beijing Division) **2019**

Second Prize in the North China Five Provinces and Hong Kong, Macao, and Taiwan College Students Computer Application Contest **2019**

Publications and Patents

[1] **Zanxi Ruan**, Nan Pu, Jiangming Chen, and Yingmei Wei. "Few-shot Event-based Action Recognition," Submitted to ECCV 2024.
[2] **Zanxi Ruan**, Yingmei Wei, Yanming Guo, and Yuxiang Xie. "Hybrid Attentive Prototypical Network for Few-shot Action Recognition," Submitted to Complex & Intelligent Systems, under second round of review.
[3] **Zanxi Ruan**, Yingmei Wei, Yanming Guo, Yuxiang Xie, and Yifei Yuan. "SCaTNet: A Novel Self-supervised Contrastive Framework with Spatial-Channel Attention and Temporal Transformer for Few-Shot Action Recognition." In Proceedings of the 2023 6th International Conference on Algorithms, Computing and Artificial Intelligence (ACAI '23), pages 135-140, 2023.
[4] Yifei Yuan, **Zanxi Ruan**, Yingmei Wei, and Tingshuai Jiang. "Exploration of Network Optimization Strategies Based On the TSN Model." In Proceedings of the 2023 6th International Conference on Algorithms, Computing and Artificial Intelligence (ACAI '23), pages 151-157, 2023.
[5] Yuxuan Yang, Beibei Han, **Zanxi Ruan**, Min Gao, and Yingmei Wei. "Attributed Graph Embedding with Random Walk Regularization and Centrality-Based Attention." Mathematics, 11(8):1830, 2023.
[6] Cai Xingquan(supervisor), **Ruan Zanxi**, Sun Haiyan. "Bank Card Number Identification Method Based on YOLOv3 and MobileNetv2." Journal of Computer-Aided Design & Computer Graphics, 34(1):142-151, 2022.
[7] "Bank card Number Identification System." Patent No: 2020SR0704783.

Research Experience

Few-shot Event-based Action Recognition **Dec 2023 – Present**

- Addressing the challenge of inadequate hardware adaptability in harsh environments for few-shot action recognition, I proposed the innovative integration of event cameras into this research area.
- Focusing on the unique characteristics of event data and the specifics of few-shot tasks, I developed novel work that combines these aspects effectively.
- As the first team to explore this task, we aim to reduce the barriers and costs associated with employing event cameras in deep learning applications, hoping to pave the way for future research and practical use in the field.

Few-shot Action Recognition **Dec 2021 – Present**

- In the context of RGB frame video for few-shot action recognition, I addressed key challenges by introducing two innovative solutions: SCaTNet and HAPN. These methods specifically target the prevalent issues of data underutilization and the decoupling of spatiotemporal continuity features.
- The HAPN model, in particular, has shown exceptional robustness and effectiveness through experimental validation. This represents a novel approach, enhancing the field of few-shot action recognition with its innovative design and application.

Undergraduate Graduation Project: Human Body Movement Style Transfer **Oct 2020 – May 2021**

- Extracted human motion skeletons from video and innovatively merged them with animation character movements using adversarial generative networks.
- Engineered a dynamic display system utilizing three.js, showcasing the integration of real human motion with virtual characters.

A Bank Card Number Recognition System Based on YOLOv3 and MobileNetV2 **Oct 2019 – Dec 2020**

- Proposed a method for bank card number recognition based on YOLOv3 and MobileNetv2 to address the low recognition rate and instability caused by factors such as complex backgrounds and lighting conditions.
- Improved data augmentation methods and optimized network structures to achieve a recognition accuracy of 97.63
- Built a one-step bank card number recognition platform using the Flask lightweight framework implemented in Python.

Project Experience

Internship at Huawei Cloud Computing Co., Ltd **July 2023 – Sep 2023**

Position: General Software Development Engineer

- Mainly responsible for the development of the cloud-native service platform and edge computing platform, including the deployment and launch of docker containers.

Internship at State Key Laboratory of Beijing University of Posts and Telecommunications **Jun 2020 – Sep 2020**

Position: Algorithm R&D Engineer

- Responsible for detecting and segmenting key information rows with minimal data, and developed an immersive BIM model experience project using UE4 for virtual reality.

Beijing College Student Innovation Project - Immersive Somatosensory Adventure Game **Apr 2019 – Oct 2020**

- Built the game scene on the Unity platform, recognized player fitness movements through Kinect, and triggered game scenarios.
- Designed and coded the Kinect pose recognition algorithm and the trigger event code.

Garbage Classification App Based on ResNet50 **Jan 2020 – Sep 2020**

- The application includes functions such as garbage classification through photo recognition, searching for classification, setting reminders for disposal, and identifying and reporting classification errors.
- Designed the application interface, collected and processed the recognition dataset, and designed and implemented the garbage recognition classification network.
- Achieved a recognition accuracy of 95.21%.

Skill Set

Full-stack Development: Proficient in end-to-end software development encompassing both front-end and back-end technologies.

3D Graphics: Strong expertise in three.js and other 3D graphics libraries enabling the creation of advanced and immersive web-based visualizations.

Virtual Environments: Familiarity with Unity and Unreal Engine for building interactive and lifelike digital simulations.

User Interface (UI) Design: Skilled in crafting user-centric interfaces that ensure an intuitive and seamless user experience.

Computer Vision: Possess several years of expertise in developing advanced computer vision algorithms using Python with a deep understanding of image analysis and pattern recognition techniques.

Programming Languages	Python (Pytorch, Tensorflow) , C++, C#, Go, JavaScript, Java
Design Tools	Photoshop, Premiere
Languages	English (IELTS 7.0)

TEACHING

Teaching assistant of Visualization and visual analytics *Prof. Yingmei Wei* **Spring 2022**
National University of Defense Technology

Teaching assistant of C++ programming *Prof. Yingmei Wei* **Spring 2022**
National University of Defense Technology