Research Experience During my Master

Xuan ZHU

Sichuan University

E-mail: zhuxuan@westlake.edu.cn/ j_zhxxx@163.com

Personal Information

Biography:

- Jun. 2022-Present Westlake University, Hangzhou, China RA
- Sep. 2019-Jun. 2022 Sichuan University, Chengdu, China GPA: **3.86**/ 4.0 (88.67/100)

Research Direction: Video Surveillance Technology for Airport Scene and image processing

- Sep. 2015-Jun. 2019 Hainan University, Haikou, China GPA: **3.70**/ 4.0 (88.27/100)

Major: Mechanical and Electronic Engineering Ranking: **5**/ 71

- Skills

Python, Matlab, PyTorch, Auto CAD, Pro/Engineering, Protues, PS, PR

- Competitions

Chinese Postgraduate Mathematical Modeling Competition, Artificial Intelligence Innovation Competition, Future Aircraft Innovation Competition, etc.

- Honor

Outstanding Graduate , National Encouragement Scholarship , First-Class Scholarship

Research Experience

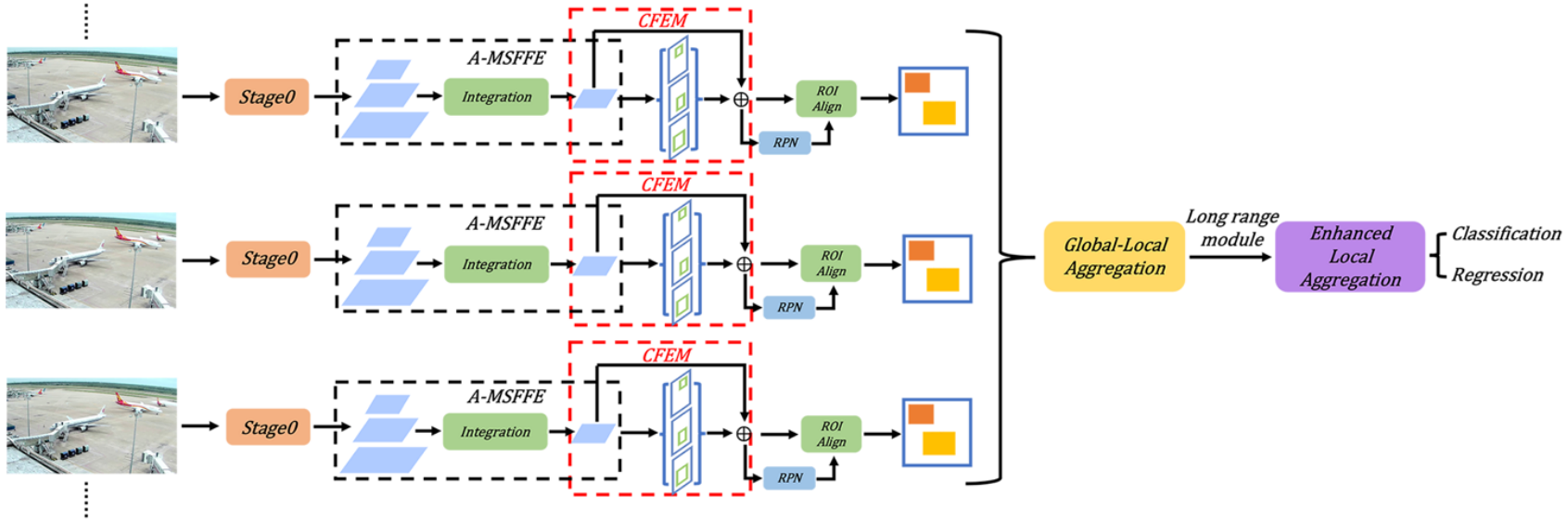
Personal Information

Research Experience

Publication 1

Airport Small Object Detection

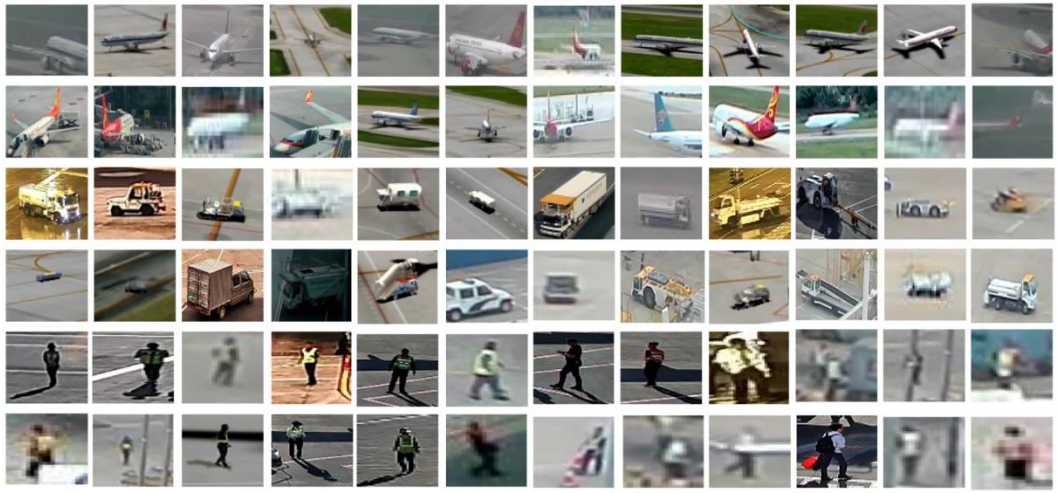
- The video detection algorithm is applied to the field of small object detection as a new idea to handle small object detection in airport video dataset.
- Proposed A-MSFFE network which can supplement spatial and semantic information of small objects and introduce deconvolution into attentional feature fusion module to merge feature maps of different levels.
- CFE module is designed to address fixed receptive fields on the feature maps.

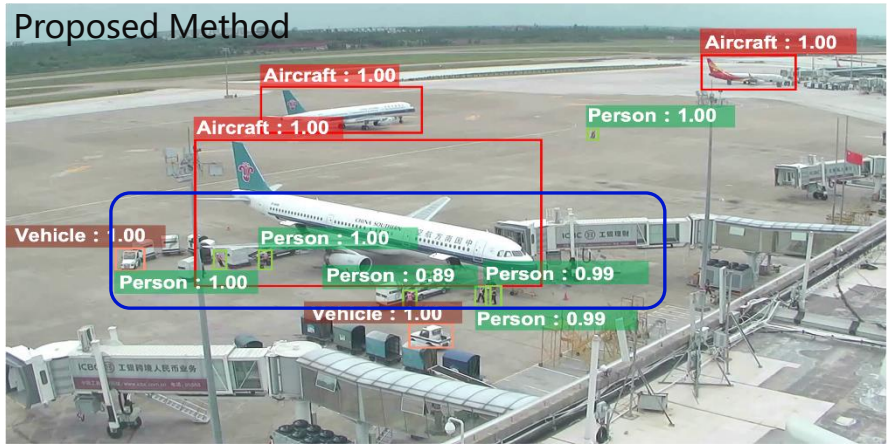


Research Experience

Visual

Airport dataset (Self-build) and Visual Results





Research Experience

Results Experimental Results

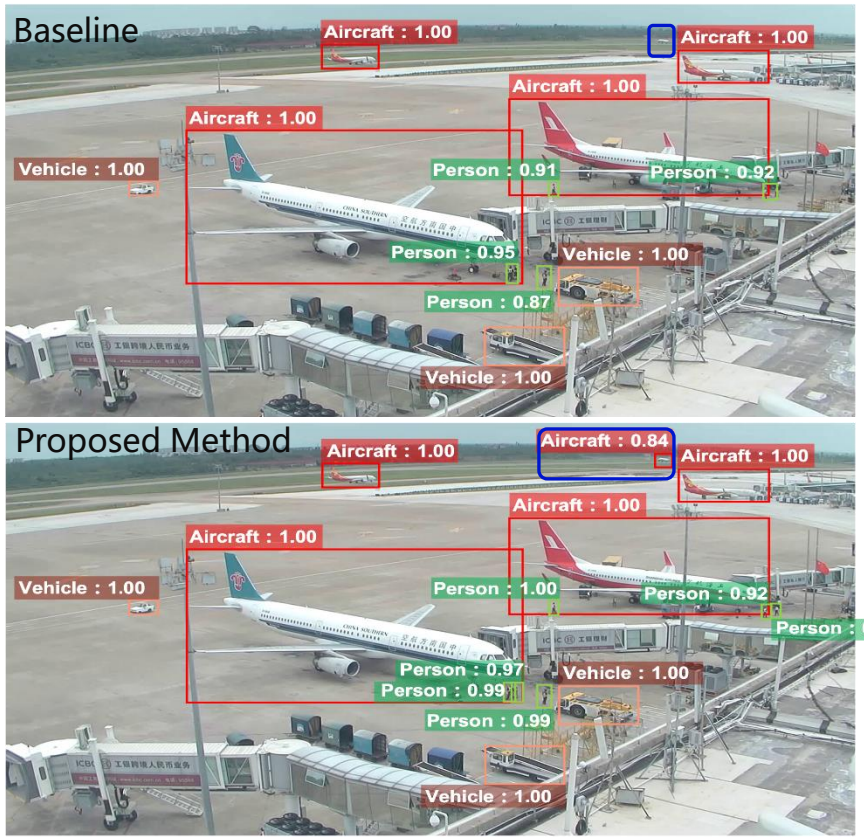
Methods	mAP	AP (aircraft)	AP (vehicle)	AP (person)	FPS
Faster R-CNN (2015)	83.59%	99.57%	93.75%	57.46%	30
DFF (2017)	78.08%	98.84%	90.44%	44.95%	35.8
FGFA (2017)	84.35%	99.69%	96.49%	56.88%	7.8
RDN (2019)	85.05%	99.87%	95.70%	59.59%	10.7
MEGA (2020)	85.21%	99.74%	93.84%	62.04%	6.2
STFT (2021)	86.20%	99.10%	95.29%	64.22%	5.7
Our Method	**89.19%**	**99.80%**	**96.56%**	**71.55%**	5.1

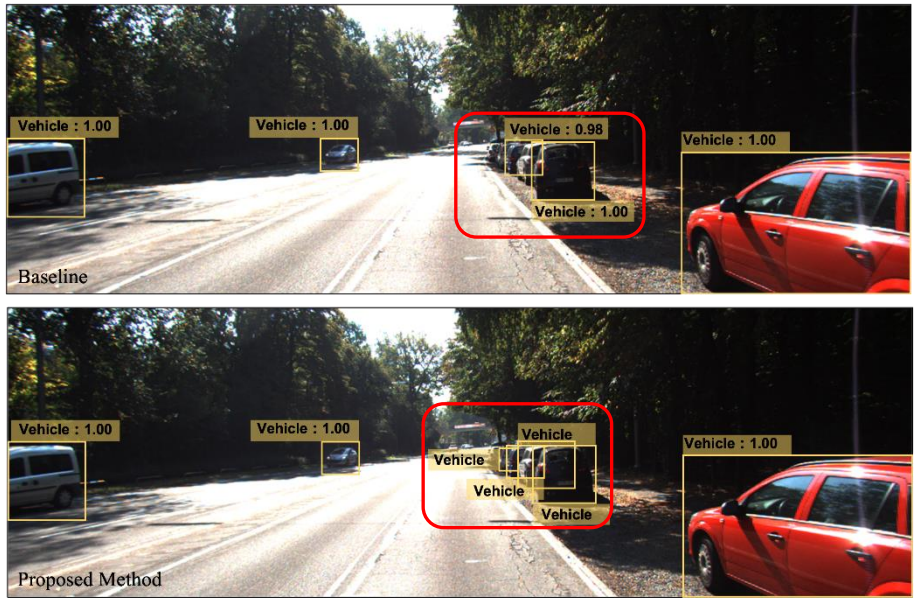
Research Experience

The Second

Video object detection

- Since the paper is still being revised, the specific content is not introduced, but some results are shown below.





Research Experience

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Research Experience

Co-author

Other Publications

- The following pictures are from papers that I cooperated my classmates and junior brother.

[1]

(a) DSFD+Low-light image (b) DSFD+MBLLEN (c) DSFD+EG (d) DSFD+R2RNet

(a) RetinaFace+Low-light image (b) RetinaFace+MBLLEN (c) RetinaFace+EG (d) RetinaFace+R2RNet

[1] Hai Jiang, **Xuan Zhu**, Ren Yang, Yutong Hao, Fengzhu Zou, Fang Lin and Songchen Han. R2RNet: Low-light. Image Enhancement via Real-low to Real-normal Network. arXiv preprint arXiv: 2106.14501, 2021.

Research Experience

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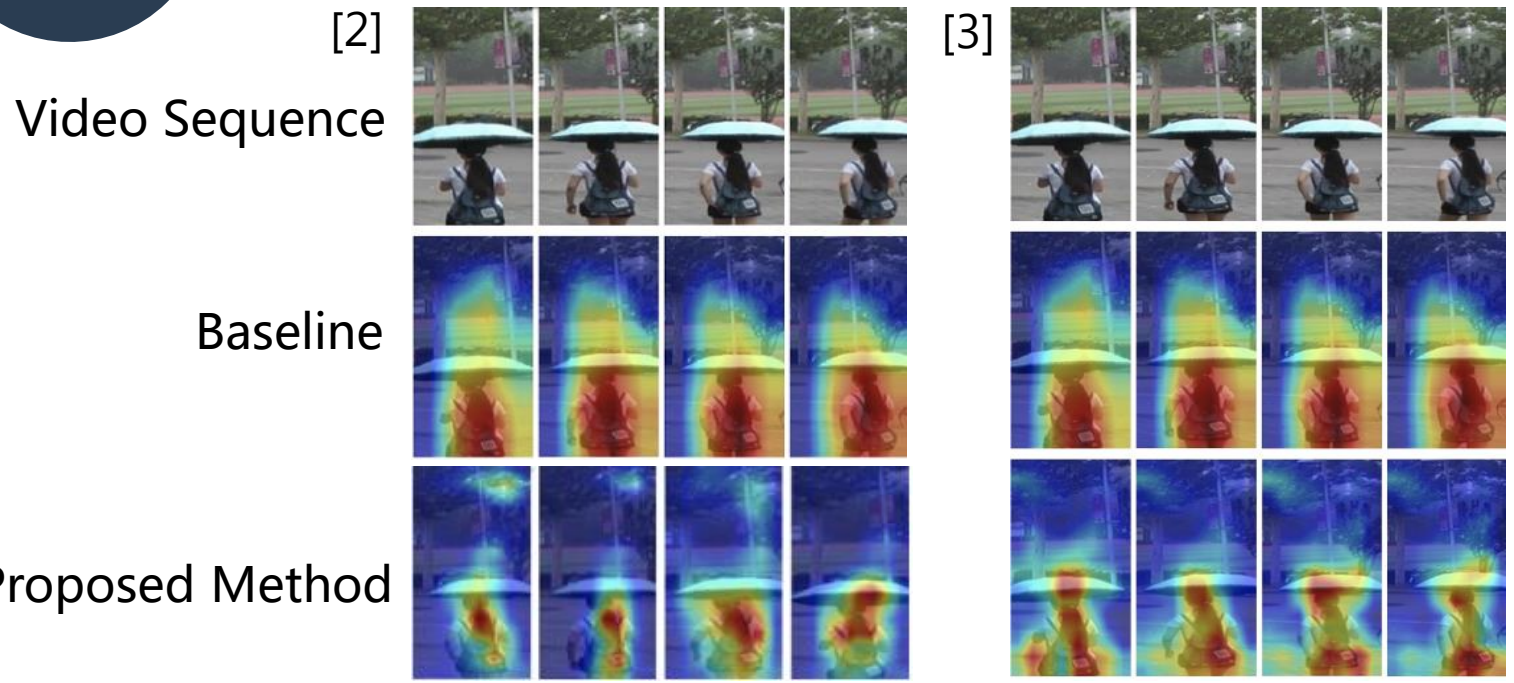

[2] Fan Yang, Xiangtong Wang, **Xuan Zhu**, Binbin Liang, Wei Li. Relation-Based Holistic-Partial Feature Learning Network for Video-Based Person Re-identification [J]. Neurocomputing, 2022, 488: 424-435.

[3] Fan Yang, Wei Li, Binbin Liang, Songchen Han, **Xuan Zhu**. Multi-stage Attention Network for Video-based Person Re-identification [J]. IET Comput.Vis. 16 (5), 445–455 (2022).

Research Experience

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Research Experience

Competition

Mathematical Modeling

- The topic we chose was visibility estimation and prediction. I was mainly responsible for determining the problem-solving ideas and the establishment of mathematical models. (**e. g.** The transmittance was calculated by the traditional dehazing algorithm, and the depth of a point in the image was estimated by using the dehazing algorithm and depth estimation method in deep learning, so as to calculate the visibility of the image. Finally, the time of fog dissipation was predicted.)

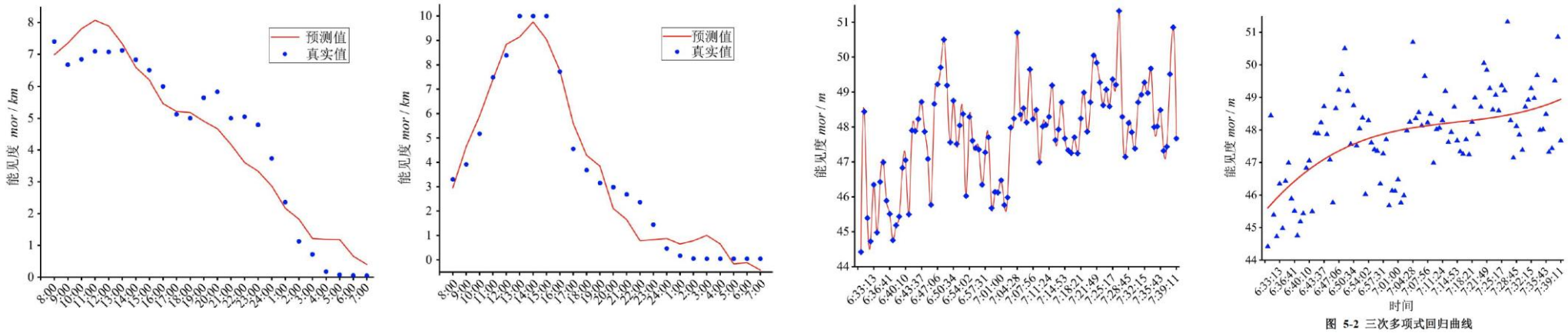

图 5-2 三次多项式回归曲线

Research Experience

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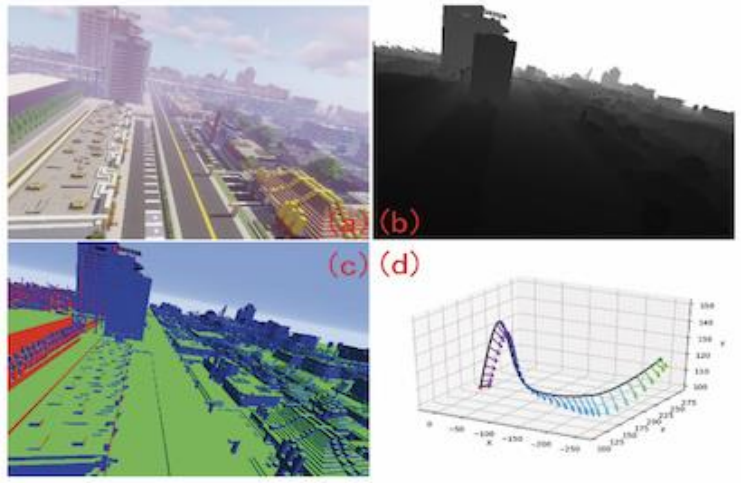
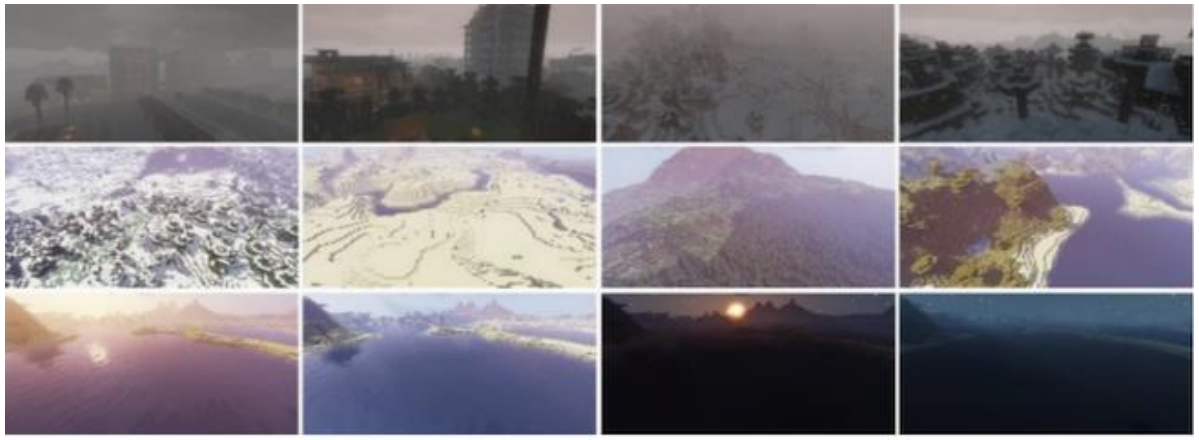
Research Experience

Competition

Artificial Intelligence

- I was mainly responsible for the debugging of the dataset. To prove that the proposed algorithm had strong generalization ability, it accurately estimated the depth of different scenes. Therefore, we developed a set of data sets, including field scenes, urban scenes, etc. It made up for the lack of current large scene datasets in depth estimation.





Research Experience

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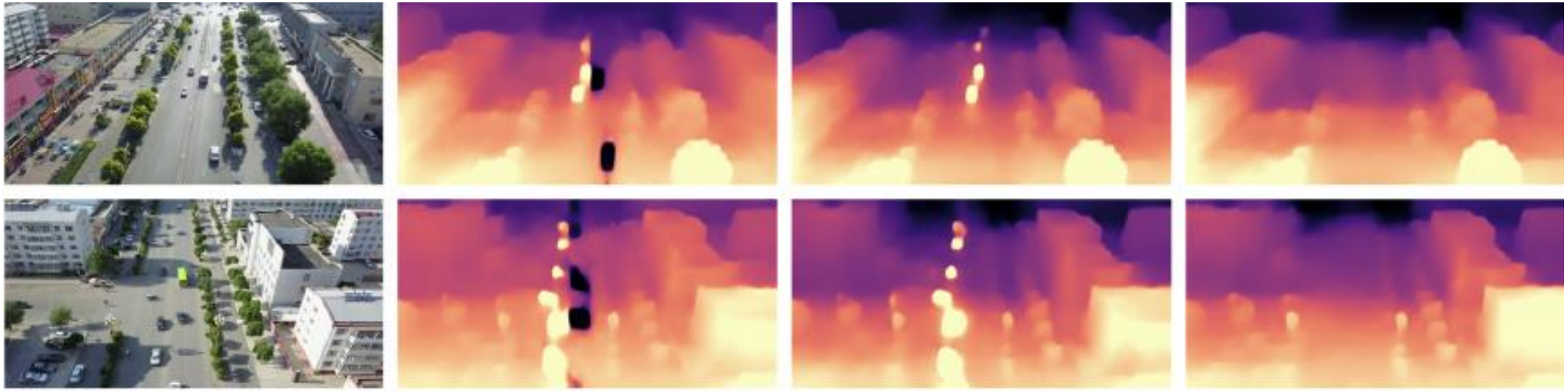
Competition

Future Aircraft Innovation Competition

- I was responsible for the debugging of algorithms on embedded devices. We transplanted the designed algorithm to the onboard embedded device for real-time inference. Therefore, we had been continuously optimizing the network, pruning, and reducing the model. Finally, model had achieved high-speed real-time inference on airborne equipment.



Publications

1. **Zhu, X.,** Liang, B., Fu, D., Huang, G., Yang, F., Li, W.: Airport Small Object Detection Based on Feature Enhancement [J]. IET Image Process. 16, 2863–2874 (2022). (CCF-C)
2. The second paper is modified. **(First Author)**
3. Hai Jiang, **Xuan Zhu**, Ren Yang, Yutong Hao, Fengzhu Zou, Fang Lin and Songchen Han. R2RNet: Low-light. Image Enhancement via Real-low to Real-normal Network. arXiv preprint arXiv: 2106.14501, 2021.
4. Fan Yang, Xiangtong Wang, **Xuan Zhu**, Binbin Liang, Wei Li. Relation-Based Holistic-Partial Feature Learning Network for Video-Based Person Re-identification [J]. Neurocomputing, 2022, 488: 424-435. (CCF-C)
5. Fan Yang, Wei Li, Binbin Liang, Songchen Han, **Xuan Zhu**. Multi-stage Attention Network for Video-based Person Re-identification [J]. IET Comput.Vis. 16 (5), 445–455 (2022). (CCF-C)
6. Fuhong Cai, Jie Chen, Chunling Zhou, **Xuan Zhu**, Sailing He. Exploratory Study on Light-sheet Based Three-Dimensional Surface Topography. Progress In Electromagnetics Research, 2018 (161): 11-18.

Patents & Awards

- ✓ A straw cutting, laying and collecting mechanism. CN 201720446745.X. Mao Lin, Yuyang Zhao, Zhiyang Jin, Chaochao Dong, Riming Xu, **Xuan Zhu** .
- ✓ A vertical green walnut peeling machine. CN 201720446951.0. Mao Lin, Chaochao Dong, Zhiyang Jin, Yuyang Zhao, **Xuan Zhu**, Wei Li.
- ✓ **Second Prize** in "Huawei Cup" The 17th Chinese Postgraduate Mathematical Modeling Competition.
- ✓ **Third Prize** in "Huawei Cup" The 2nd Chinese Postgraduate Artificial Intelligence Innovation Competition.
- ✓ **Third Prize** in "Flying Shark Cup" The 6th Chinese Postgraduate Future Aircraft Innovation Competition.

Research Projects

- ✓ Research on Airport Moving Object Detection, Tracking and Matching Technology Based on Multi-feature Fusion, Key Research and Development Project in Sichuan Province
- ✓ Cross-view Multi-Object Intelligent Tracking Technology in Airport Flight Area, Chengdu Science and Technology Key Research and Development Support Plan
- ✓ Research and Development of Key Technologies and Equipment for Airport Fire Safety, National Key Research and Development Projects

四川大學

SICHUAN UNIVERSITY

Thank you!