Weihua Chen

Ph.D. in Computer Vision

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Education & Eexperience

02/2018 - Present **Alibaba DAMO Academy, Beijing, China**
Senior Algorithm Engineer

09/2014 - 02/2018 **National Laboratory of Pattern Recognition (NLPR),**
Institute of Automation, Chinese Academy of Sciences (CASIA), Beijing, China
Ph.D. in Computer Vision

08/2012 - 08/2014 **NLPR, CASIA, Beijing, China**
Algorithm Engineer in Video Surveillance

09/2005 - 07/2012 **Beijing Jiaotong University**
B.Eng. and M.Eng. in Singal and Information Processing, advised by Prof. Zhenjiang Miao

Research

03/2022-03/2023 **Self Supervised Learning** Python, Pytorch
• For widely used human-centric applications, we aim to build a general human pre-trained model benefiting to all downstream human visual tasks. Hence, we design a Semantic Controllable Self-Supervised Learning Framework **[CVPR23]**, the pre-trained model from which achieves state-of-the-art on six downstream human visual task.

07/2022-03/2023 **Real-Time Object Detection (DAMO-YOLO)** Python, Pytorch
• We develop a fast and accurate object detection framework called DAMO-YOLO. It outperforms state-of-the-art YOLO series and attracts more than **2.5K+ star** on Github.

03/2020-03/2022 **Unsupervised Domain Adaptation** Python, Pytorch
• Adapting models to new scenarios with unlabeled data has great value in real applications, so we design series of unsupervised domain adaptive methods to solve this problem. Specifically, applying cross attention **[ICLR2022]** to solve domain alignment for segmentation task and classification task, designing multi-view evolutionary training **[TIFS2022]** and progressive domain adaptation strategy **[ICCV2021]** to improve pseudo labels for retrieval task and re-identification task. Our method has won **[1st in VisDA]** challenge on ECCV20 and **[2nd in ILR]** challenge on ICCV21. Besides, we put some attentions on how to generate and refine synthetic images **[MM21,MM22]** for new scenarios.

08/2014-02/2020 **Person Re-identification** Python, Pytorch, Tensorflow, Caffe
• For the supervised person re-identification issue, we provide series of works from different aspects to improve the performance, including quadruplet loss **[CVPR2017 Spotlight, Cited 1k+]**, multi-task learning **[AAAI2017 Oral]**, representation uncertainty **[ECCV22]** and graph convolution rerank **[ICASSP22]**. Our method has also won many worldwide challenges, *e.g.*, **[1st in AICITY]** on CVPR21, **[1st in MCMPTC]** on ICCV21, **[1st in TAO]** on ECCV20, **[2nd in RobMOTS]** on CVPR21 and **[3rd in AICITY]** on CVPR20.

08/2013-07/2014 **Multi-Camera Multi-Object Tracking** C++, OpenCV
• Developing a multi-object tracking algorithm. Firstly we achieved a robust and real-time single object tracking to produce tracklets with high confidences **[ICCV VOT2013]**. Then we represented tracklets with PMCSHR features and associated tracklets in multiple cameras **[ICIP2014]**. At last, an equalised graphical model was proposed to solve the imbalance during associating the tracklets in multiple cameras and a new benchmark was introduced for multi-object multi-camera tracking **[Trans.CSVT2016]**.

Projects

09/2018 - 12/2021 **A City-level Security Surveillance Solution** ReID Algorithm Leader

- The solution can track person in city among tens of millions people across thousands of cameras, and has been deployed to multiple cities.
- Our model can autonomously discover the domain gap from different cities and different wethers, and finetune itself to reduce the gap to fit new scenarios.
- A complete data-collection system is built to automatically collect data and do labeling, and an image synthesis system is designed to generate synthetic images according to different scenarios.
- Other advantages: any accessory or part can be used for person search in our system; new and old features from our algorithm can search each other; our system supports incremental learning.
- Besides large cities, our solution has also been deployed on many communities and offline shopping malls.

09/2014 - 12/2021 **Other Applications**

- Build a surveillance for court to recognize different dresses and behaviors of the people in court.
- Develop a SDK to detect objects in CAD drawings and recognize their directions.
- Develop an algorithm that can recognize the time in the drawings from Alzheimer patients, and assess their conditions based on the drawings.
- Build a Multi-Camera Multi-Object Tracking System (See https://github.com/cwhgn/EGTracker)

Selected Publications

[1] Beyond Appearance: a Semantic Controllable Self-Supervised Learning Framework for Human-Centric Visual Tasks
Weihua Chen, Xianzhe Xu, Jian Jia, Hao Luo, Yaohua Wang, Fan Wang, Rong Jin, Xiuyu Sun
IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**), 2023.

[2] Reliability-Aware Prediction via Uncertainty Learning for Person Image Retrieval
Zhaopeng Dou, Zhongdao Wang, **Weihua Chen**, Yali Li, and Shengjin Wang
The European Conference on Computer Vision (**ECCV**), 2022.

[3] TAGPerson: A Target-Aware Generation Pipeline for Person Re-identification
Kai Chen, **Weihua Chen**, Tao He, Rong Du, Fan Wang, Xiuyu Sun, Yuchen Guo, Guiguang Ding
The 29th ACM International Conference on Multimedia (**ACM MM**), 2022.

[4] Multi-view Evolutionary Training for Unsupervised Domain Adaptive Person Re-Identification
Jianyang Gu, **Weihua Chen**, Hao Luo, Fan Wang, Hao Li, Wei Jiang, Weijie Mao
IEEE Transactions on Information Forensics and Security (**TIFS**), 2022.

[5] CDTrans: Cross-domain Transformer for Unsupervised Domain Adaptation
Tongkun Xu, **Weihua Chen**, Pichao Wang, Fan Wang, Hao Li, Rong Jin
The International Conference on Learning Representations (**ICLR**), 2022.

[6] Exploring the Quality of GAN Generated Images for Person Re-Identification
Yiqi Jiang, **Weihua Chen**, Xiuyu Sun, Xiaoyu Shi, Fan Wang, Hao Li
The 29th ACM International Conference on Multimedia (**ACM MM**), 2021.

[7] Towards discriminative representation learning for unsupervised person re-identification
Takashi Isobe, Dong Li, Lu Tian, **Weihua Chen**, Yi Shan, Shengjin Wang
The IEEE/CVF International Conference on Computer Vision (**ICCV**), 2021.

[8] Beyond Triplet Loss: A Deep Quadruplet Network for Person Re-identification
Weihua Chen, Xiaotang Chen, Jianguo Zhang, Kaiqi Huang
IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**), **Spotlight**, 2017.

[9] A Multi-task Deep Network for Person Re-identification
Weihua Chen, Xiaotang Chen, Jianguo Zhang, Kaiqi Huang
The Thirty-First AAAI Conference on Artificial Intelligence (**AAAI**), **Oral**, 2017.

[10] An Equalised Global Graphical Model-Based Approach for Multi-Camera Object Tracking
Weihua Chen, Lijun Cao, Xiaotang Chen, Kaiqi Huang
IEEE Transactions on Circuits and Systems for Video Technology (**TCSVT**), 2016.

Activities

Competition

The 2nd place in Google Landmark Retrieval Competition (**ILR**) on ICCV 2021.
The 1st place in Multi-camera Multi-Person tracking (**MCMPTC**) on ICCV 2021.
The 1st place in **AICITY** Challenge Track3 Multi-camera Vehicle Tracking on CVPR 2021.
The 1st place in **AICITY** Challenge Track2 Vehicle Re-Identification on CVPR 2021.
The 2nd place in **RobMOTS**: The Ultimate Tracking Challenge on CVPR 2021.
The 1st place Tracking Any Objects (**TAO**) Challenge on ECCV 2020.
The 1st place Visual Domain Adaptation (**VisDA**) Challenge on ECCV 2020.
The 3rd place in **AICITY** Challenge Track2 Vehicle Re-Identification on CVPR 2020.
Organize the Multi-Camera Object Tracking (**MCT**) Challenge in Visual Surveillance and Re-identification Workshop on ECCV 2014

Talk

Invited tutorial talk in IJCB 2021 with the topic of Human-centric Visual Understanding: From Research to Applications.

Reviewer

Serve as Reviewer for top conferences and journals, such as PAMI/CVPR/ICCV/ECCV.

Skills

Programming Languages
- Proficient in C/C++, Python, and Matlab. Experience with Java.

Tools and Frameworks
- Proficient in Caffe and OpenCV.