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Yu-Hsi Chen

Summary

Yu-Hsi Chen has rich experience in developing **computer vision and machine learning** algorithms. In his recent work at Academia Sinica, he has focused on using machine learning to solve traditional computer vision and image/video processing problems. His developed **NeighborTrack** is a **state-of-the-art single object tracking system** in the field.

Work Experience

Computer Vision Engineer **07 2015 - Now**
Academia Sinica, Institute of Information Science(I.I.S.) *Taipei*

- Developed and improved many state-of-the-art deep learning models (CNN, C3D, Siamese Network, Transformer, and YOLO series) in Python3 and PyTorch.
- Top Achievement: NeighborTrack[Che+22], the most accurate single-object tracking method in the world.
- Research scope: **Computer Vision**: Object detection/tracking, Person Re-Identification and Video Stabilization.

Project

Single object tracking **03 2021**
I.I.S. Research, Framework:python/pytorch

- Designed a post-processing method NeighborTrack[Che+22] to introduce neighbor and temporal information to alleviate the error tracking of single object tracking.
- Proved NeighborTrack is the state-of-the-art single-object tracking model as the accuracy on LaSOT is 72.2% AUC. Project page: https://github.com/franktpmvu/NeighborTrack

Multiple object tracking **08 2019**
I.I.S. Research, Framework:python/pytorch

- Used multi-scale features and non-local net in unknown class multiple object tracking to Improve base method accuracy.
- Improved the base model by 1.2x Average Precision (33% to 40%) in MOT17 dataset.

Video based fall detection **04 2019**
I.I.S. Research, Framework:python/tensorflow

- Implemented optical flow features and data augmentation to improve the accuracy of C3D-pelee deep learning network in fall detection tasks.
- Increased the accuracy of the basic network, UCF101 dataset from 57.1 to 59.5, MCF dataset from 85.4 to 87.5.

Video person Re-ID **04 2018**
*I.I.S. Research, **Team work**, Framework:python/tensorflow on **embedding system** Jetson TX2*

- Adapted the mobilenetV2 person ReID system to the embedded system Jetson TX2, which has only 7% of the computing power of the desktop computer GPU RTX 1080TI.
- Participated in AISlanders' Show 2018 and CES 2019.

Emotion reading system **06 2016**
I.I.S. Research, Framework:python/caffee

- Combined face detection and emotion recognition to build a speaker assistance system that captures audience emotions in real time and provides feedback.

Video Stabilization[CLS14] **08 2014**
Master's Thesis, Framework:MATLAB

- Implemented SIFT feature matching to get the camera movement path and update it to a stable path with content-preserving warping.
- Submitted to IIHMSP2014 and won the Excellent paper award.

High-Dynamic Range image mapping **05 2013**
Senior project, Framework:MATLAB

- Developed a MATLAB-based **HDR** system using histogram equalization and entropy to map an HDR image to an 8-bit RGB image.

Camera Automatic Exposure and Automatic White Balance **09 2012**
*Senior project, **Team Leader**, Framework: quatus verilog on embedding system DE2-70*

- Implemented verilog for an **AE and AWB camera system** on an FPGA-based embedded system.
- Led four students to participate in the FPGA contest held by Altera asia.

Research Publications

[CLS14] Yu Hsi Chen, Hsueh Yi Sean Lin, and Chih Wen Su. "Full-Frame Video Stabilization via SIFT Feature Matching". In: *2014 Tenth International Conference on Intelligent Information Hiding and Multimedia Signal Processing*. 2014, pp. 361–364. DOI: 10.1109/IIH-MSP.2014.96.

[Che+22] Yu-Hsi Chen et al. *NeighborTrack: Improving Single Object Tracking by Bipartite Matching with Neighbor Tracklets*. 2022. DOI: 10.48550/ARXIV.2211.06663. URL: https://arxiv.org/abs/2211.06663.

Skills

Programming	Python, MATLAB, LaTeX, shell, MarkDown, Git.
Development Tool	Pytorch, Caffee, Tensorflow.
Embedded OS	Linux on Jetson TX2.
Communication	Chinese (native), English (beginner), Japanese (beginner)
Other	Github, Microsoft Office, Docker

Education

Master of Science **09 2013 - 08 2015**
LUNGHWA university

Main courses: (1) MATLAB: Video Stabilization, Image Processing.

Bachelor of Computer Information and Network Engineering **09 2009 - 07 2013**
LUNGHWA university

Main courses: (1) Quatus Verilog: Camera AE, Camera AWB. (2) MATLAB: HDR.