YONG-TUO LIU

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RESEARCH INTERESTS

- Machine Perception: computer vision, multimodality, theoretical machine learning
- Apply for 2021 Fall Ph.D. programme.

EDUCATION

South China University of Technology *Aug. 2018 - Jun. 2021 (Expected)*

- M.Sc. in Computer Science and Technology
- Research area: Crowd Scene Analysis. Supervisor: Prof. Shengfeng He

China University of Mining and Technology *Aug. 2011 - Jun. 2015*

- B.Sc in Electrical Engineering and Automation
- Research area: Robot Control. Supervisor: Prof. Yanzi Miao

EXPERIENCE

Hong Kong University of Science and Technology (HKUST) *Jul. 2020 - present*

- Intern, conduct research on self-supervised 3D vision
- Supervisor: Prof. Dan Xu

China Nuclear Power Technology Research Institute *Jul. 2015 - Mar. 2018*

- R&D Simulation and Control Engineer, conduct research on steam turbine control system
- Supervisor: Dr. Feng Wang

PAPER LIST

- **Yongtuo Liu**, Qiang Wen, Haoxin Chen, Wenxi Liu, Jing Qin, Guoqiang Han, and Shengfeng He, "Crowd Counting via Cross-stage Refinement Networks", in *IEEE Transactions on Image Processing (**IEEE TIP**), 2020.*

  - In this work, we propose a Cross-stage Refinement Network for accurate crowd counting that can refine predicted density maps progressively based on hierarchical multi-level density priors. Besides, we also explore different crowd-specific data augmentation methods to mimic real-world scenarios and enrich crowd feature representations from different aspects.

- Liangyu Chai*, **Yongtuo Liu***, Wenxi Liu, Guoqiang Han, and Shengfeng He, "CrowdGAN: Identity-free interactive Crowd Video Generation and Beyond", in *IEEE Transactions on Pattern Analysis and Machine Intelligence (**IEEE TPAMI**), Major Revision.* (*denotes equal contribution)

  - In this paper, we introduce a novel yet challenging research problem, interactive crowd video generation, committed to producing diverse and continuous crowd video, and relieving the difficulty of insufficient annotated real-world datasets in crowd analysis. Unlike previous works, the proposed method generates continuous crowd behaviors beyond identity annotations or matching.

- Qianshu Zhu, **Yongtuo Liu**, and Shengfeng He, "Weakly Supervised Segmentation via Instance-aware Propagation", in ***Neurocomputing**, Minor Revision.*

  - Peak Response Map (PRM) can localize instances of each class via gradient back propagation, but it cannot provide reliable information for segmentation even with off-the-shelf object proposals. To this

end, we propose an Instance-aware Cue-propagation Network (ICN) with a new proposal-matching strategy to tackle this problem. In particular, the ICN aims to filter out background distractions and cover more complete instance, while the proposed proposal-matching strategy adds a new re-balancing constraint on the contributions of multi-scale object proposals.

- **Yongtuo Liu**, Dan Xu, Hanjie Wu, Haoxin Chen, and Shengfeng He, "Cross-domain Crowd Counting via Dual Attentive Discriminators", *Manuscript*.

  - In this work, we propose two label-free feature and density map discriminators for domain adaptation across various crowd scenes. In particular, we consider independently the foreground crowd and background clutters for fine-grained feature discrimination, and exploit the soft attention map indicating foreground crowd areas to generate target-domain pseudo labels as density-map domain constraints.

- **Yongtuo Liu**, Dan Xu, Sucheng Ren, Yuan Liang, and Shengfeng He, "A New Few-shot Setting for Crowd Counting", *Manuscript*.

  - The counting labeling is onerous as it requires to manually label each individual in the crowd. In view of this, we introduce a new few-shot setting to alleviate this problem, where only few individuals are annotated in each crowd image. We formulate the new setting as a domain adaptation problem. In particular, the annotated crowd areas are considered as source domain, while the other predicted areas are target domain.

AWARDS

- Chinese National Scholarship (1/68), by Minister of Education of China, 2020
- Science and Technology Innovation Scholarship of "Hong Ping Chang Qing", by Graduate School of South China University of Technology, 2020
- Intel AI Academy Student Ambassador (the only one at SCUT), 2019
- Intel Special Award for OpenVINO research, 2019
- Science and Technology Innovation Scholarship of SALIAI (3/68), 2019
- First-class Scholarship, by Graduate School of South China University of Technology, 2019

PROJECTS

DataFountain Adversarial AI Challenge *Oct. 2019 - Nov. 2019*

- Title: Remote Sensing Image Classification
- Role: Team member
- Duties included: Mainly dedicated to the investigation and re-implementation of general adversarial algorithms. In particular, we modify MI-FGSM as the baseline model, and adopt the ensemble learning strategy to attack several substitutes of the target model.
- Ranking: 2/409.

China Graduate AI Innovation Competition *Jun. 2019 - Sep. 2019*

- Title: Crowd Warning System based on Raspberry Pi and Intel Neural Compute Stick [Homepage]
- Role: Team leader
- Duties included: Mainly conduct research on the algorithm optimization and deployment on the edge computing device. In particular, we bulid an edge computing environment with Raspberry Pi 4 and Neural Compute Stick2 (NCS2).
- Ranking: Excellent

SKILLS

- **Program Languages:** most experienced with Python, Matlab; experienced with C/C++; LaTeX
- **Development Platforms and Softwares:** Tensorflow, Pytorch
- **Operating Systems:** Ubuntu, Windows, MacOS
- **Miscellaneous:** software configuration management, excellent troubleshooting and debugging skills, strong verbal and written communication skills
- **Languages:** Chinese(native), English(fluent)

REFEREES

Available upon request.