Zheng (Thomas) Tang

Research Scientist - Amazon One · Expert in Computer Vision and Machine Learning

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Summary

Current Research Scientist - Amazon One at Amazon · Ph.D. in Electrical & Computer Engineering at the University of Washington (Advisor: Prof. Jenq-Neng Hwang) · Associate Editor of TCSVT · 9-month internship at NVIDIA working on city-scale vehicle tracking and ReID with papers accepted to CVPR'19 and ICCV'19 · Leader of the winning team at the 2nd AI City Challenge Workshop in CVPR'18 · Member of the Organizing Committee for the 4th AI City Challenge Workshop in CVPR'20 · Finalist of 2 Best Student Paper Awards at ICPR'16

Education

University of Washington (UW) — *Seattle, WA, USA*

Ph.D. in Electrical & Computer Engineering — *Sep. 2014 - Jun. 2019*

- Advised by Prof. Jenq-Neng Hwang (IEEE Fellow) at the Information Processing Lab
- Dissertation topic: Robust Video Object Tracking via Camera Self-Calibration

University of Washington (UW) — *Seattle, WA, USA*

M.S. in Electrical Engineering — *Sep. 2014 - Mar. 2016*

- GPA: 3.83/4.0

Beijing University of Posts and Telecommunications (BUPT) — *Beijing, China*

B.S. in Telecommunications Engineering with Management (Joint Programme) — *Sep. 2010 - Jun. 2014*

- GPA: 88.73/100

Queen Mary University of London (QMUL) — *London, UK*

B.S. in Telecommunications Engineering with Management (Joint Programme) — *Sep. 2010 - Jun. 2014*

- First Class Honours

Work Experience

Amazon — *Seattle, WA, USA*

Research Scientist - Amazon One — *Jul. 2019 - PRESENT*

- Working on the research team for **Amazon One**, a fast and convenient identity service using people's palm for payment, entry and more
- Advanced the development of a **non-contact biometric identification system** for palm signatures captured using light of varying polarity

NVIDIA — *Santa Clara, CA, USA*

Intelligent Video Analytics Intern — *Jun. 2018 - Mar. 2019*

- Created **CityFlow**, a city-scale benchmark for multi-target multi-camera (MTMC) vehicle tracking and ReID, accepted to **CVPR'19 (Oral)**
- Proposed **PAMTRI**, a pose-aware multi-task network for vehicle ReID using highly randomized synthetic data, accepted to **ICCV'19**
- Joined the Organizing Committee of the **4th AI City Challenge Workshop** in **CVPR'20** that attracted 315 participating teams across 37 countries

University of Washington — *Seattle, WA, USA*

Research Assistant — *Jun. 2015 - Jun. 2018*

- Developed evolutionary camera calibration and clustering-based data association for vehicle tracking using fusion of visual and semantic features that achieved rank #1 in **Track 1 (Traffic Flow Analysis)** of the **2nd AI City Challenge Workshop** in **CVPR'18**
- Designed multi-camera tracking based on fusion of adaptive appearance models, CNN features and license plate information that achieved rank #1 in **Track 3 (Multi-camera Vehicle Detection & ReID)** of the **2nd AI City Challenge Workshop** in **CVPR'18**
- Built a 3D human pose estimator to enable overlaying AR for medical simulation under 6-DoF camera motion, where a two-step evolutionary pose optimization for camera and humans (2EPOCH) is proposed (funded by ArchieMD Inc.)
- Proposed evolutionary camera self-calibration from tracking of humans to automatically back project 2D trajectories into 3D, which was a finalist of **2 Best Student Paper Awards** at **ICPR'16** (funded by Prism Skylabs)
- Invented an adaptive segmentation and tracking algorithm based on multi-kernel feedback that achieved top single-camera tracking accuracy (**74.82%**) on the **NLPR_MCT** benchmark (funded by Madrona Venture Group)

Teaching Experience

University of Washington — *Seattle, WA, USA*

Teaching Assistant of EE 508: Stochastic Processes in Engineering — *Mar. 2019 - Jun. 2019*

- Designed topics for final projects, provided tutorials on hidden Markov model and held weekly office hours

Publications

Journal Articles

MOANA: An online learned adaptive appearance model for robust multiple object tracking in 3D
Zheng Tang, Jenq-Neng Hwang
IEEE Access 7.1 (2019) pp. 31934–31945. 2019

ESTHER: Joint camera self-calibration and automatic radial distortion correction from tracking of walking humans
Zheng Tang, Yen-Shuo Lin, Kuan-Hui Lee, Jenq-Neng Hwang
IEEE Access 7.1 (2019) pp. 10754–10766. 2019

Online-learning-based human tracking across non-overlapping cameras
Young-Gun Lee, Zheng Tang, Jenq-Neng Hwang
TCSVT 28.10 (2018) pp. 2870–2883. 2018

Conference Papers

The 4th AI City Challenge
Milind Naphade, Shuo Wang, David C. Anastasiu, Zheng Tang, Ming-Ching Chang, Xiaodong Yang, Liang Zheng, Anuj Sharma, Rama Chellappa, Pranamesh Chakraborty
Proc. CVPR Workshops, 2020, Virtual

PAMTRI: Pose-aware multi-task learning for vehicle re-identification using highly randomized synthetic data
Zheng Tang, Milind Naphade, Stan Birchfield, Jonathan Tremblay, William Hodge, Ratnesh Kumar, Shuo Wang, Xiaodong Yang
Proc. ICCV, pp. 211–220, 2019, Seoul, Korea

CityFlow: A city-scale benchmark for multi-target multi-camera vehicle tracking and re-identification
Zheng Tang, Milind Naphade, Ming-Yu Liu, Xiaodong Yang, Stan Birchfield, Shuo Wang, Ratnesh Kumar, David Anastasiu, Jenq-Neng Hwang
Proc. CVPR, pp. 8797–8806, 2019, Long Beach, CA, USA

Joint multi-view people tracking and pose estimation for 3D scene reconstruction
Zheng Tang, Renshu Gu, Jenq-Neng Hwang
Proc. ICME, pp. 1–6, 2018, San Diego, CA, USA

Single-camera and inter-camera vehicle tracking and 3D speed estimation based on fusion of visual and semantic features
Zheng Tang, Gaoang Wang, Hao Xiao, Aotian Zheng, Jenq-Neng Hwang
Proc. CVPR Workshops, pp. 108–115, 2018, Salt Lake City, UT, USA

Inter-camera tracking based on fully unsupervised online learning
Young-Gun Lee, Zheng Tang, Jenq-Neng Hwang, Zhijun Fang
Proc. ICIP, pp. 2607–2611, 2017, Beijing, China

Multiple-kernel adaptive segmentation and tracking (MAST) for robust object tracking
Zheng Tang, Jenq-Neng Hwang, Yen-Shuo Lin, Jen-Hui Chuang
Proc. ICASSP, pp. 1115–1119, 2016, Shanghai, China

Camera self-calibration from tracking of moving persons
Zheng Tang, Yen-Shuo Lin, Kuan-Hui Lee, Jenq-Neng Hwang, Jen-Hui Chuang, Zhijun Fang
Proc. ICPR, pp. 260–265, 2016, Cancún, México

Patent

Neural Network System for Object Identification
Zheng Tang, Stan Birchfield, William Hodge, Ratnesh Kumar, Milind Naphade, Jonathan Tremblay, Shuo Wang, Xiaodong Yang
U.S. Patent No. 16/442,375 (Pending), 2019

Honors & Awards

2019	**People's Choice Award**, Code for the Kingdom (C4TK) Hackathon	*Seattle, WA, USA*
2018	**Winner of Track 1 (Traffic Flow Analysis)**, 2nd AI City Challenge Workshop in CVPR'18	*Salt Lake City, UT, USA*
2018	**Winner of Track 3 (Multi-camera Vehicle Detection & ReID)**, 2nd AI City Challenge Workshop in CVPR'18	*Salt Lake City, UT, USA*
2017	**Winner of Track 2 (AI City Applications)**, 1st AI City Challenge Workshop in SmartWorld'17	*San Francisco, CA, USA*
2016	**Finalist IBM Best Track 3 Student Paper Award**, ICPR'16	*Cancún, México*
2016	**Finalist Intel Best Track 3 Student Paper Award**, ICPR'16	*Cancún, México*

Skills

Programming	Python (expert), C/C++ (expert), Java (proficient), JavaScript (proficient), MATLAB (expert), LaTeX(expert)
Frameworks & Tools	PyTorch (expert), TensorFlow (expert), MXNet (proficient), Caffe (proficient), Git (expert), React (proficient)
Languages	English (proficient), Mandarin (native), Cantonese (native), Spanish (elementary)