Zheng (Thomas) Tang

Research Scientist · Computer Vision Expert

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Summary

Current Research Scientist at Amazon · Ph.D. in Electrical & Computer Engineering from the University of Washington (Advisor: Prof. Jenq-Neng Hwang) · Research interests in computer vision and machine learning · 9 months internship at NVIDIA working on city-scale vehicle tracking and ReID with papers accepted at CVPR'19 and ICCV'19 · Leader of the winning team at the 2nd AI City Challenge Workshop in CVPR'18 · Organizing committee member of the 4th AI City Challenge Workshop in CVPR'20 · Finalist best student paper awards in 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.com — *Seattle, WA, USA*

Research Scientist — *Jul. 2019 - PRESENT*

- Working on a new project directed by **Prof. Gérard Medioni** at the **physical store technology team** that developed Amazon Go

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 at **CVPR'19 (Oral)**
- Proposed **PAMTRI**, a pose-aware multi-task network for vehicle ReID using highly randomized synthetic data, accepted at **ICCV'19**
- Supported the **3rd AI City Challenge Workshop** in **CVPR'19** that attracted 334 academic and industrial research teams from 44 countries
- Joined the organizing committee of the **4th AI City Challenge Workshop** in **CVPR'20**, in charge of the MTMC tracking and ReID tracks

University of Washington — *Seattle, WA, USA*

Research Assistant — *Dec. 2014 - 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**
- Proposed multi-kernel vehicle tracking based on 3D deformable models that outperformed the state-of-the-art object tracking methods, selected as the winning method of **Track 2 (AI City Applications)** at the **1st AI City Challenge Workshop** in **SmartWorld'17**
- Developed a 3D casualty 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.)
- Implemented multi-view 3D tracking of soccer players and the ball that enabled real-time soccer analytics (funded by a startup company)
- Developed single-camera people tracking that is robust against occlusion and cluttered background to provide useful features for object ReID across multiple cameras (funded by Madrona Venture Group)

Prism Skylabs — *San Francisco, CA, USA*

Engineering Intern — *Jul. 2015 - Aug. 2015*

- Developed adaptive segmentation and tracking based on multi-kernel feedback that achieved top single-camera tracking accuracy (**74.82%**) on the **NLPR_MCT** benchmark
- Developed evolutionary camera self-calibration from tracking of humans to automatically back project 2D trajectories into 3D, which received **2 Finalist Best Student Paper Awards** in **ICPR'16**

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

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

Self-calibration of traffic surveillance cameras based on moving vehicle appearance and 3-D vehicle modeling
Na Wang, Haiqing Du, Yong Liu, Zheng Tang, Jenq-Neng Hwang
Proc. ICIP, pp. 3064–3068, 2018, Athens, Greece

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

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	C/C++ (expert), Python (expert), Java (proficient), MATLAB (expert), Linux (expert), React (proficient), LaTeX(expert)
Deep Learning	PyTorch (expert), TensorFlow (expert), Caffe (proficient)
Languages	English (proficient), Mandarin (native), Cantonese (native), Spanish (elementary)