

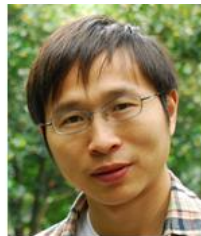


## Person Re-Id: Recent Advances and Challenges

# Summary and New Research Possibilities



Shiliang Zhang  
Peking University  
Beijing, China



Jingdong Wang  
Microsoft Research  
Beijing, China



Qi Tian  
University of Texas at  
San Antonio, USA



Wen Gao  
Peking University  
Beijing, China



Longhui Wei  
Peking University  
Beijing, China

Institute of Digital Media

Peking University

2018.5.15



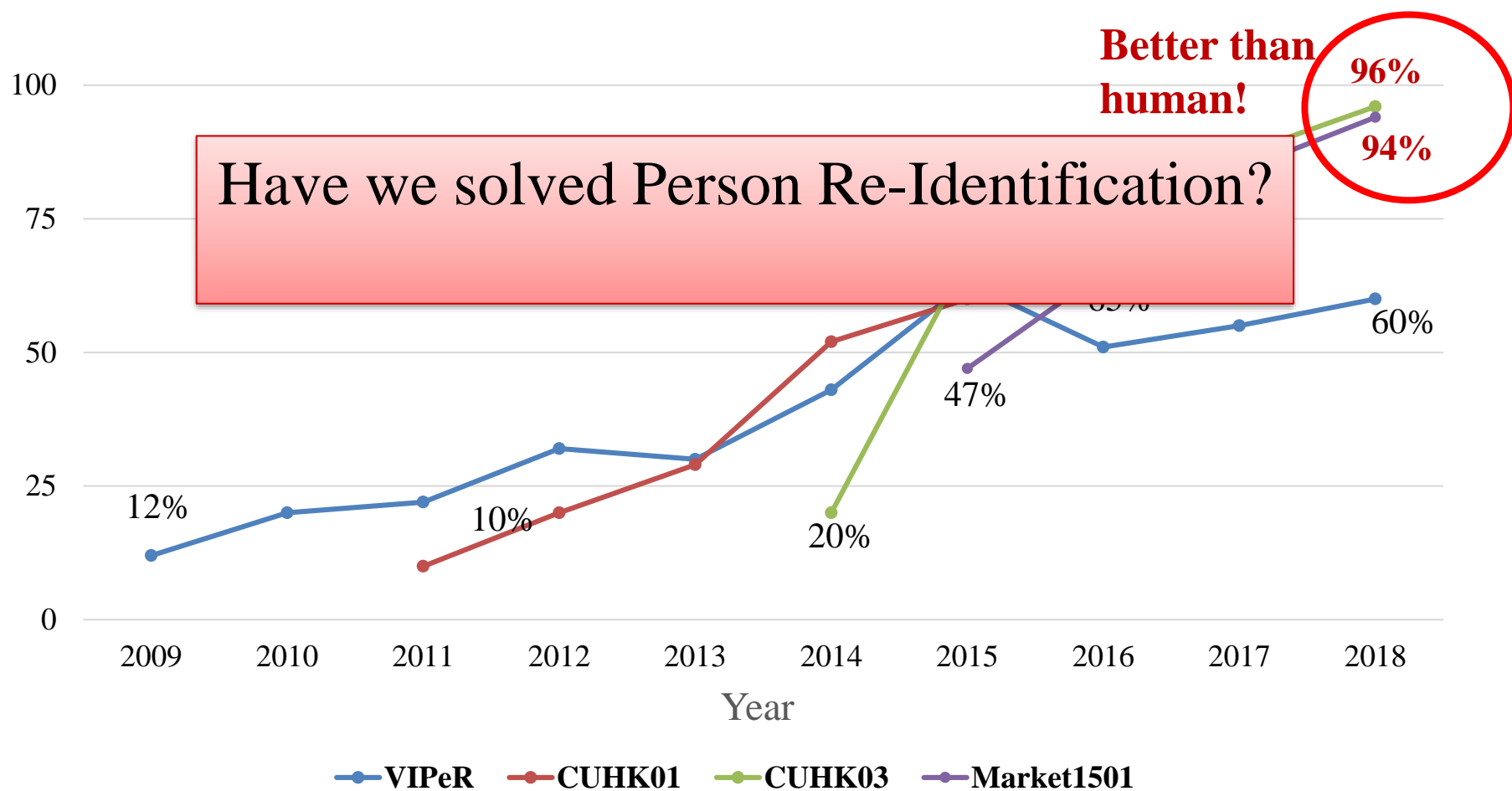
# Topics covered by this tutorial

---

- ☐ *Local and part representations*
- ☐ *Attribute Learning*
- ☐ *Scalability*
- ☐ *Datasets*
- ☐ *Data augmentation with GAN*



# Performance Boost





# Existing Dataset vs. **Real Ones**

Datasets	<i>Duke</i>	<i>Market</i>	<i>CUHK03</i>	<i>CUHK01</i>	<i>VIPeR</i>	<b>Real World</b>
<b>BBoxes</b>	36,411	32,668	28,192	3,884	1,264	<b>1M +</b>
<b>Identities</b>	1,812	1,501	1,467	971	632	<b>10K +</b>
<b>Cameras</b>	8	6	2	10	2	<b>20 +</b>
<b>Time Span</b>	Short	Short	Short	Short	Short	<b>Long</b>
<b>Scene</b>	Outdoor	Outdoor	Indoor	Indoor	Outdoor	<b>Outdoor, Indoor</b>

- ❑ Existing public datasets differ from real data
  - Smaller scale
  - Fixed scenes
  - Shot term data, simple lighting condition



# New Research Possibilities

---

## ☐ Dataset

- 3D Graphics model for data synthesis
- Short term -> long term
- Other cues: gait, face, spatial-temporal, phone location

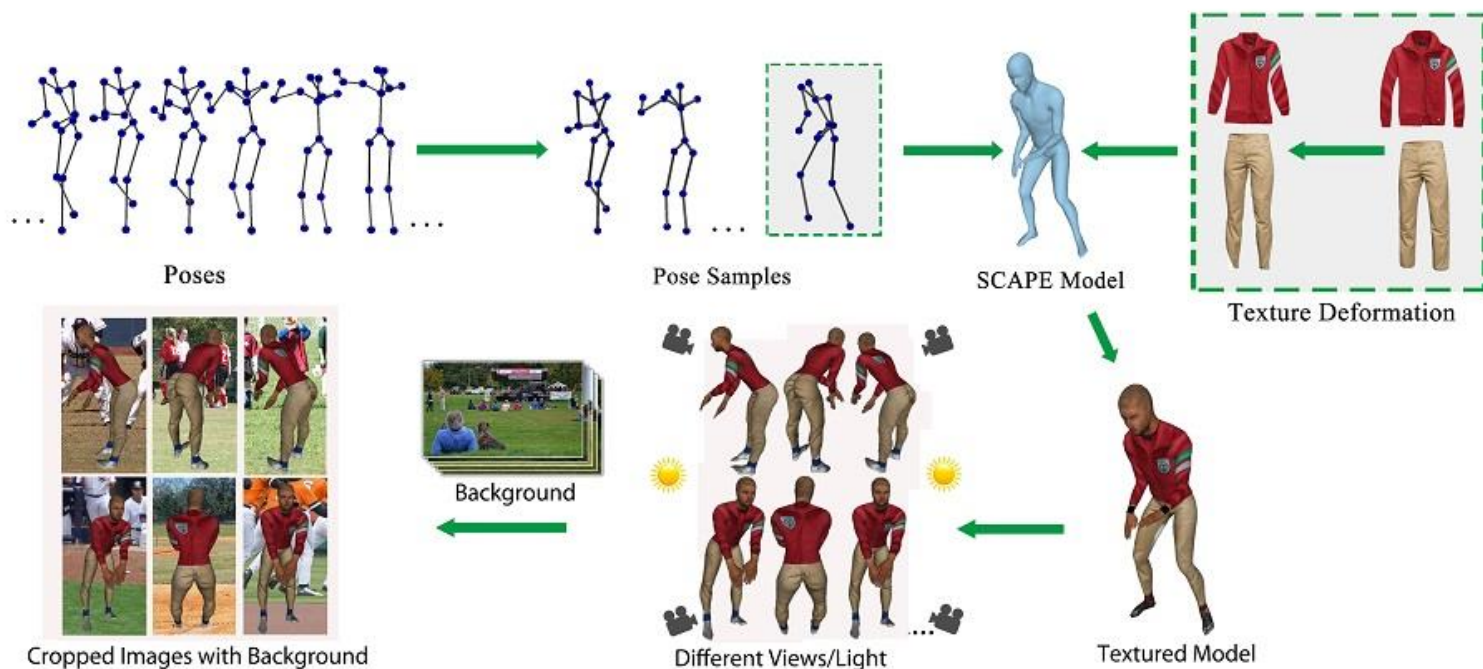
## ☐ Methods

- Utilization of unlabeled data
- Domain adaptation
- Super-resolution for low quality image
- End-to-end of detection and recognition
- Better representation for tracklet (fusion of motion and appearance)
- Zero-shot / One-shot / Low-shot deep models
- In-chips design



# Datasets

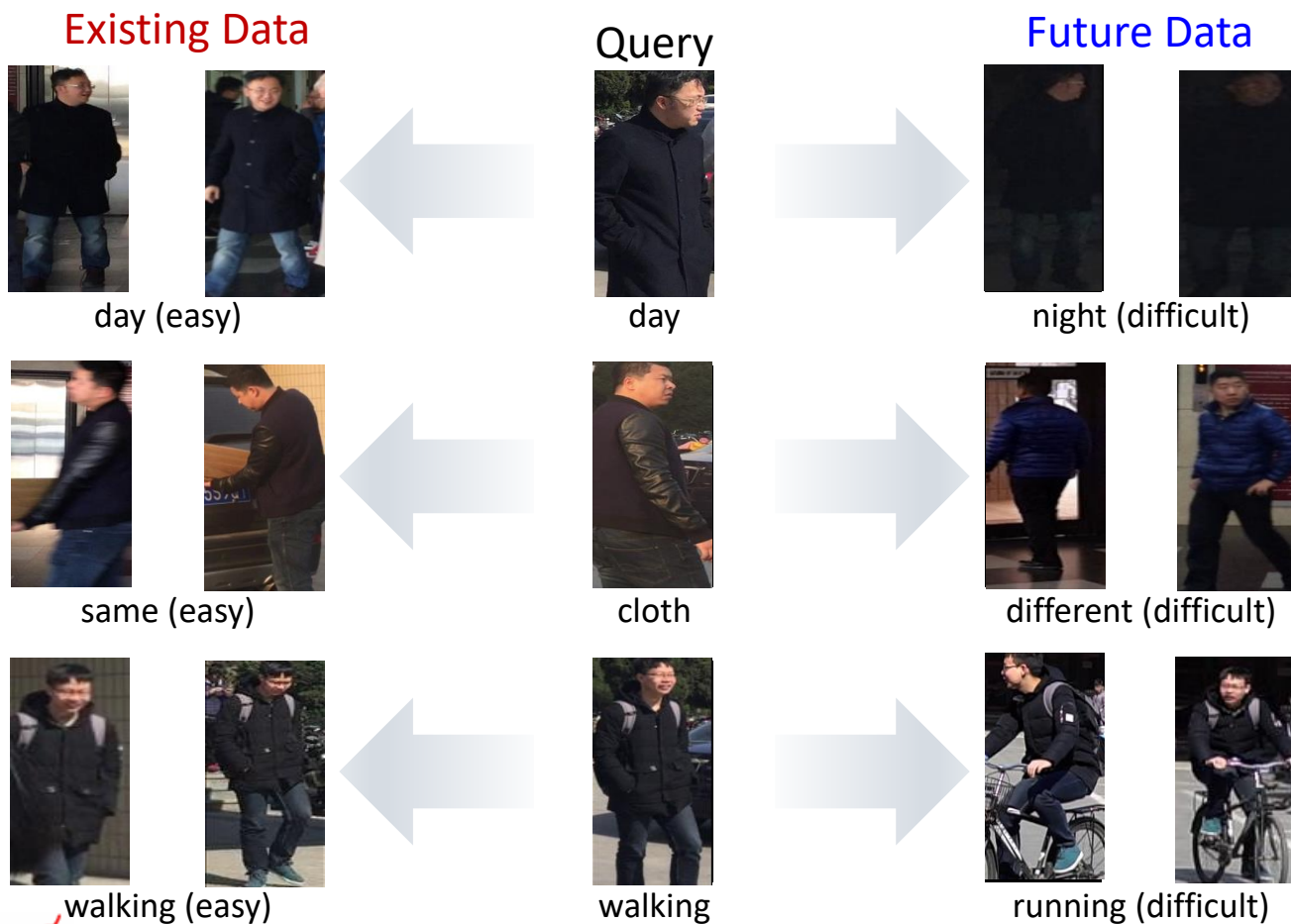
## □ 3D model for Generating Synthesized Training Data



W. Chen et al., "Synthesizing Training Images for Boosting Human 3D Pose Estimation," 2016 Fourth International Conference on 3D Vision (3DV), Stanford, CA, USA, 2016, pp. 479-488.

# Datasets

- More real-world scenario -- large variance (time, clothing, gait, etc.) of scene and pedestrians







# Methods

- Information Fusion (Time stamp, GPS and map, cell phone, wi-fi, Gait, Face, 4K/8K, 3D/Depth)



After Time Stamp  
+GPS information  
are combined







# Methods

## □ Re-identification in the Wild

Current (easy):  
Re-id  
in the box



Future (difficult):  
Re-id in the wild





# Reference

---

## part & local representation

- 1) Pose-driven Deep Convolutional Model for Person Re-identification, C. Su et al, ICCV 2017.
- 2) Deeply-learned part-aligned representations for person re-identification, L. Zhao et al, ICCV 2017
- 3) Part-Aligned Bilinear Representations for Person Re-identification
- 4) Learning Correspondence Structure for person re-identification, W. Lin et al, TIP 2017
- 5) Person re-identification with correspondence structure learning, Y. Shen et al, ICCV 2015
- 6) Glad: Global-local-alignment descriptor for pedestrian retrieval, L. Wei et al, ACM MM 2017.

## Attributes

- 7) Multi-task learning with low rank attribute embedding for multi-camera person re-identification
- 8) Multi-type attributes driven multi-camera person re-identification, C. Su et al, PR 2018.
- 9) Attributes driven tracklet-to-tracklet person re-identification using latent prototypes space mapping, C. Su et al, PR 2017
- 10) Deep attributes driven multi-camera person re-identification, C. Su et al, ECCV 2016
- 11) Multi-task learning with low rank attribute embedding for person re-identification, C. Su et al, ICCV 2015

## Loss

- 12) Multi-scale triplet cnn for person re-identification, J. Liu, ACM MM 2016
- 13) Exemplar-guided similarity learning on polynomial kernel feature map for person re-identification, D. Chen, IJCV 2017
- 14) Similarity learning on an explicit polynomial kernel feature map for person re-identification, D. chen, CVPR, 2015
- 15) Deep representation learning with part loss for person re-identification, H. Yao et al, Arxiv 2017.

## Search

- 16) Large-scale person re-identification as retrieval, H. Yao et al, ICME 2017
- 17) Part-based deep hashing for large-scale person re-identification, F. Zhu et al, TIP 2017.
- 18) Glad: Global-local-alignment descriptor for pedestrian retrieval, L. Wei et al, ACM MM 2017.

## Benchmark

- 19) Person transfer GAN to bridge domain gap for person ReID, L. Wei et al, CVPR 2018
- 20) Person re-identification in the wild, L. Zheng et al, ICCV 2017
- 21) Mars: A video benchmark for large-scale person re-identification, L. Zheng et al, ECCV 2016
- 22) Scalable person re-identification: A benchmark, L. Zheng et al, CVPR 2015

## GAN

- 23) Person transfer GAN to bridge domain gap for person ReID, L. Wei et al, CVPR 2018



---

Thanks for coming!  
Have a nice time in Xi'an !

We will upload the slides to:  
[www.pkuvmc.com](http://www.pkuvmc.com)