CVWC2019

Amur Tiger Identification Challenge

Track-3&4 winner Solution

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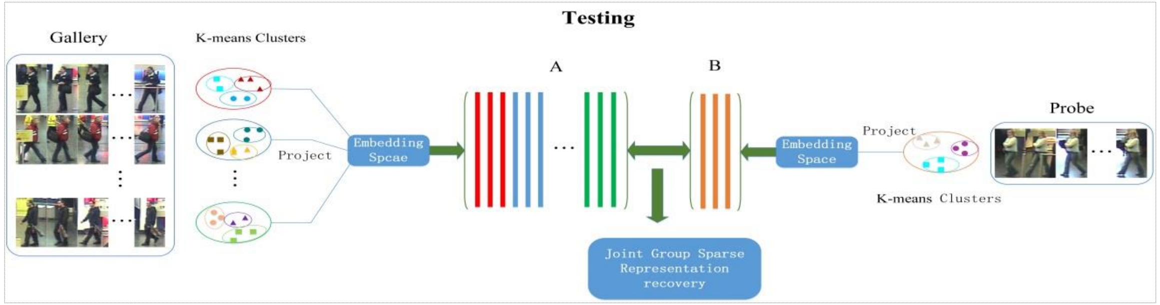
Agenda

1. Background
2. Summary
3. Model design
4. To do
5. Team Members

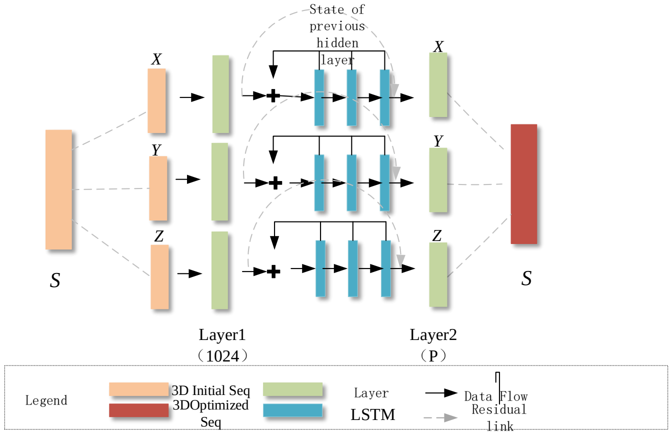
Background

Current research work

- person ReID



- 3D human pose estimation



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Analysis on this competition

- Identify a tiger by its stripe
- Have a lots of Similarity with Person Re-id
- Use the loacal + globle feature
- Deal with alignment -> keypoint information

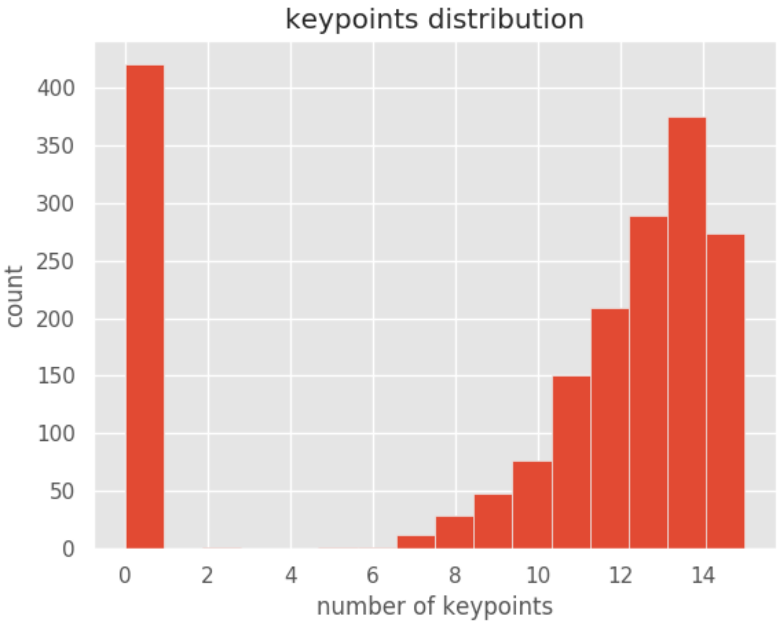
Analysis on dataset

- A tiger under unconstrained illumination conditions

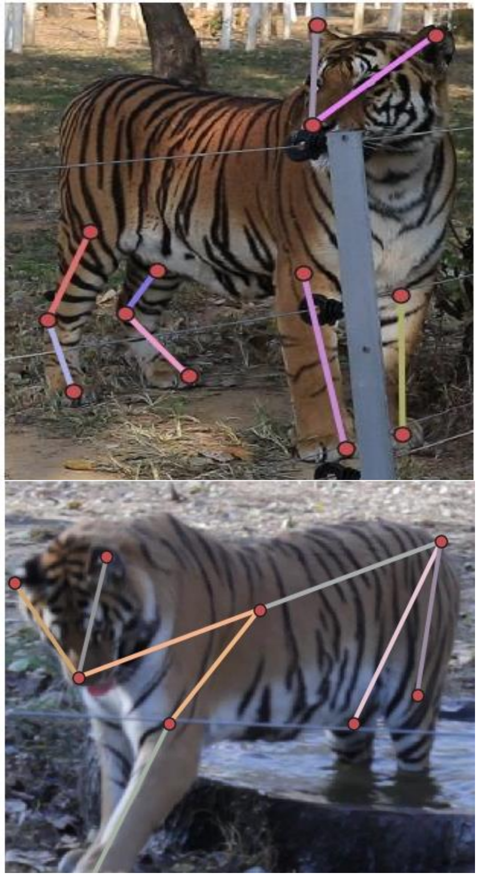
- A tiger with different poses

- A tiger with different degrees of occlusion
- Defferent tigers with very similar stripes

Analysis on dataset



Missing pose information !



Main idea

- Design model to utilize the keypoint information effectively.

- Try more backbones ->

  resnet50, resnet101, se-resnet101....

- End to end training with triplet loss + id loss.

- Effective use of some tricks in person Re-ID.

Model Design

- Data augmentation
- Pose part construction
- Model structure

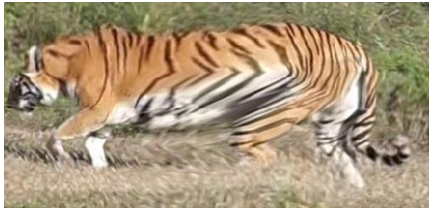
Data augmentation

- 128*256 or 256*512 cropped images as input
- Randomly do blur, grayscale, noise, rotate, crop piecewise affine

original

blur

noise



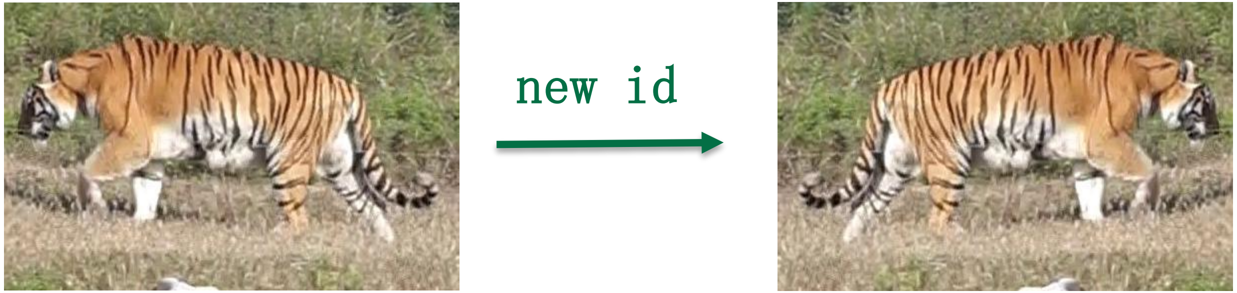
crop piecewise affine

grayscale

Data augmentation

- *A trick*

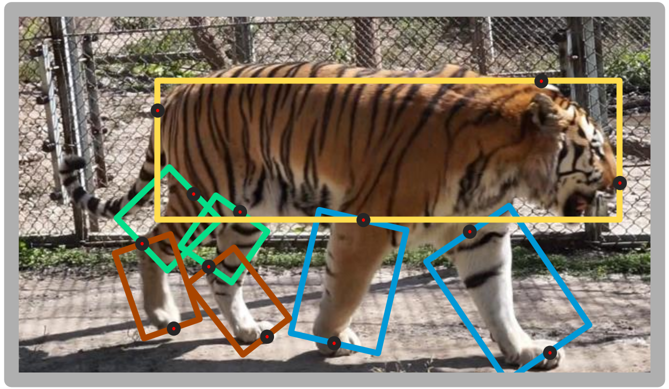
’Since the left and right side of Amur Tigers have different stripe patterns, and it is rare to capture both sides of the tiger in the wild environment, **we treat different sides of the same tiger as a different entity.** ’

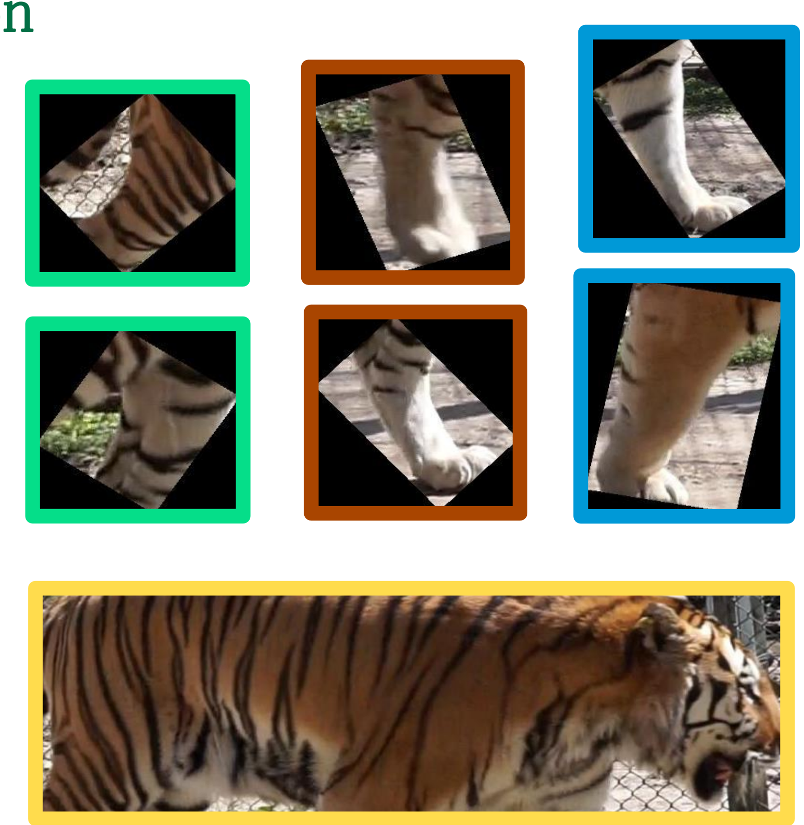


Right side

Left side

Pose part construction

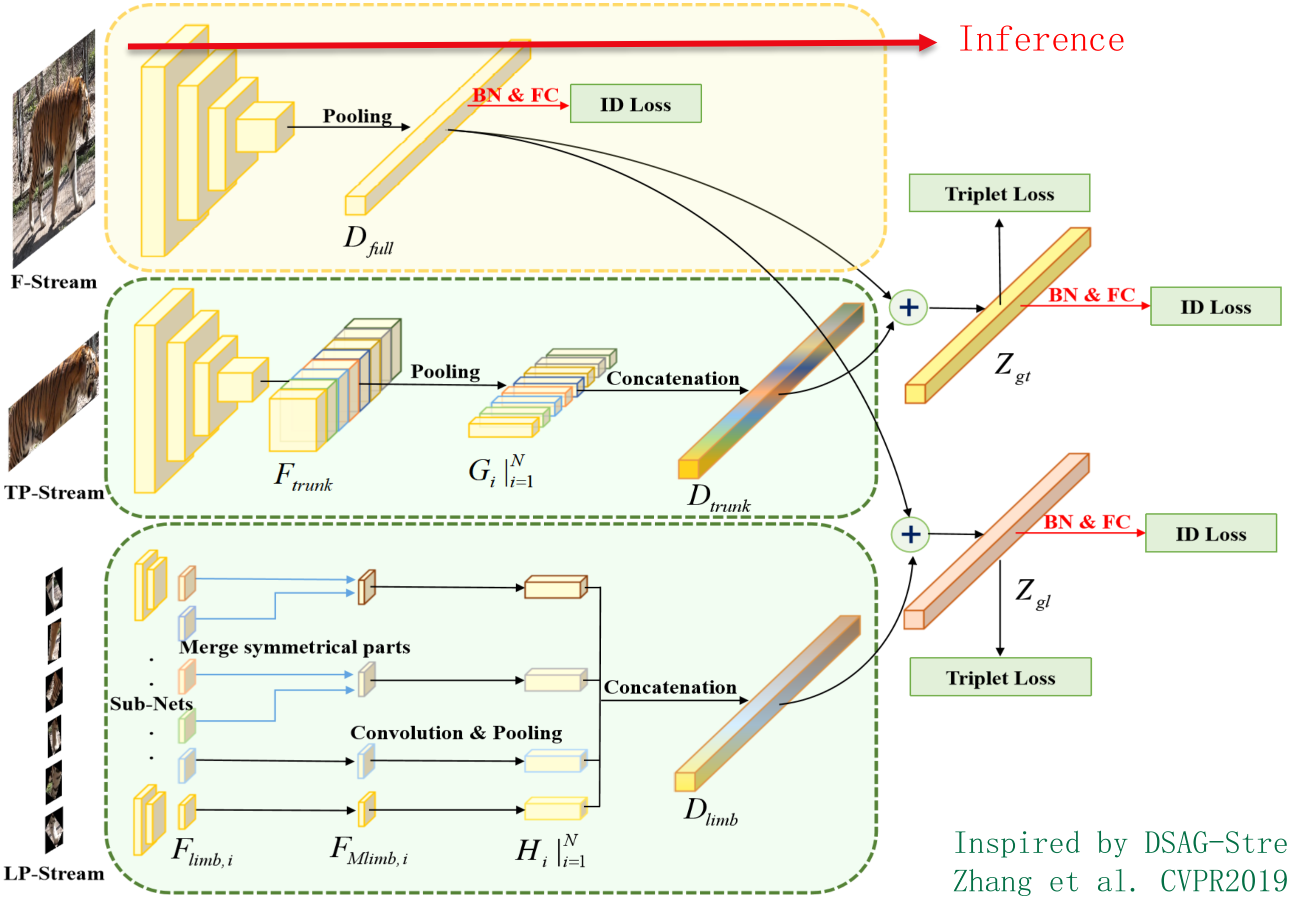




missing parts ->
an rectangle in black background

Model Design

Model structure: Part-Pose Guided Network



Inspired by DSAG-Stream
Zhang et al. CVPR2019

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Details for implementation

- Warmup Learning Rate
- Removed the last spatial downsampling
- Cosine distance as the measure of similarity.
- Part-stream backbone: ResNet34 with 64*64
- Add Rerank

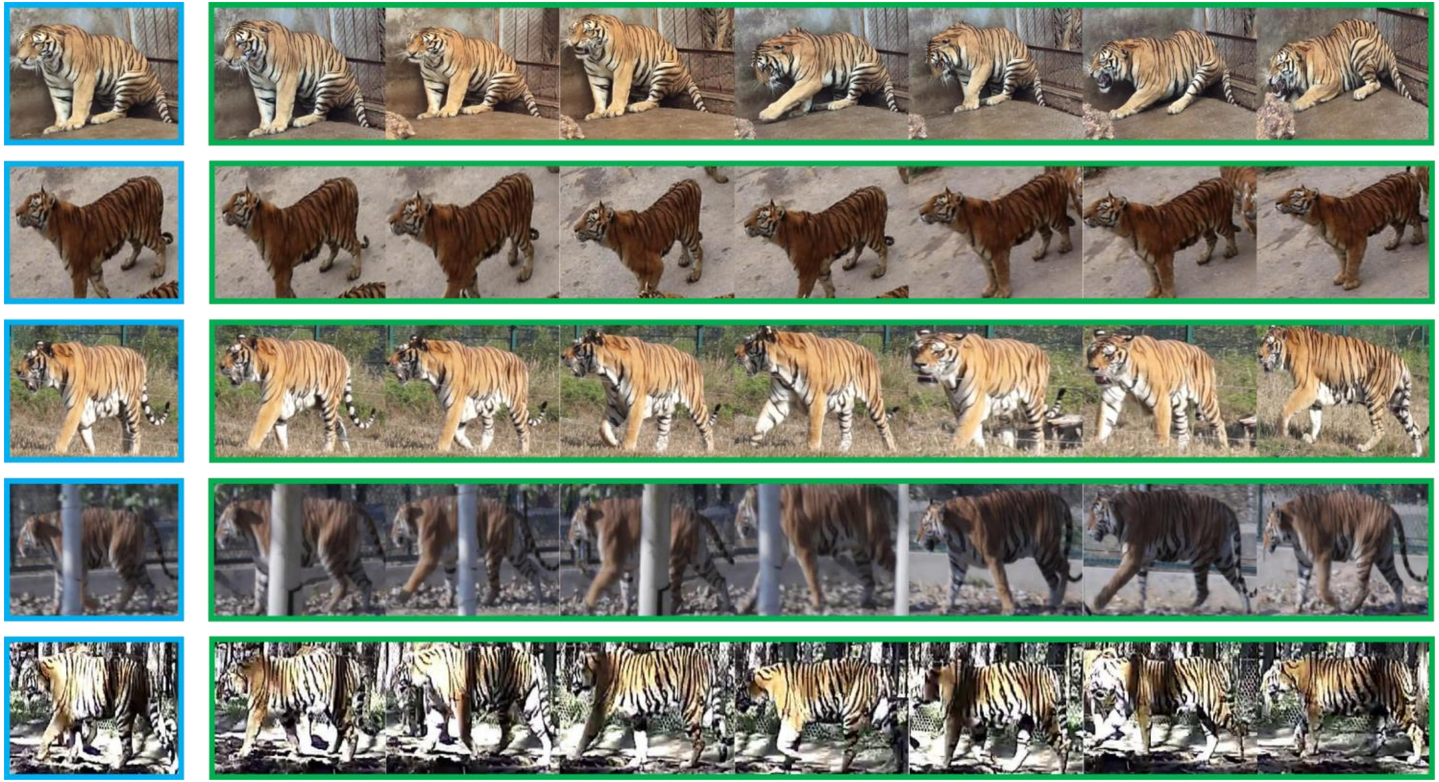
Single model performance

Plain Reid

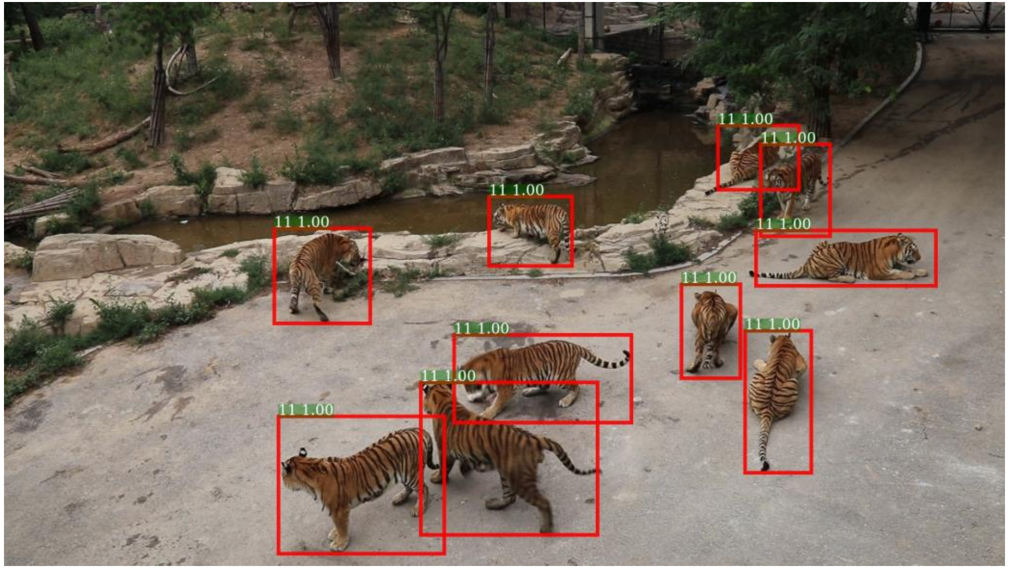
single model	Test-dev(mmAP of Single-Cam and Cross-Cam)
se-resnet50_128x256	0.74964
se-resnet101_128x256	0.74965
se-resnext101_128x256	0.74703
resnet152_128x256	0.75686
resnet50_256x512	0.77944
resnet101_256x512	**0.81216**
resnet152_265x512	0.80265

Model Design

Example result of Rank 1—Rank 7



Wild Reid



Detector : Faster_Rcnn-R-50 ~0.4600

fine model: use the **Best reid** model ~0.8050!

TODO

- Try more backbones
- Re-detect dataset
- Ensemble models
- Optimized detector
- Fine grained methods

Team Members

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Thanks