ATRW Challenge Summary and Awards

Jianguo Li
Intel Labs

Weiyao Lin
Shanghai JiaoTong University

Hanlin Tang
Intel AI Lab

Greg Mori
Simon Fraser University

Joachim Denzler
Friedrich Schiller University Jena

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Outline

- Background

- Prototype System and Dataset

- CVWC Workshop & Challenge

- Awards

Background

- Wildlife conservation is critical for maintaining species biodiversity
  - Require monitoring the geospatial distribution + population health
  - Challenges: wide range of activity, poaching, loss of habitat, …
  - Government and env-orgs like WWF dedicate resources on this issue

Amur Tiger

- Also known as Siberian Tiger, North-eastern Tiger
- Top species in the eco-system (king of animals)
- Live in Far east region: China/Russia
- Top-10 endangered species in the world
- Pure wild: ~600

Motivation

- Current Status
  - Camera Trap: battery powered, SD card, 1~3 months replaced once.
  - Human check to identify tigers

- Emerging Tech
  - Imagery sensors like smart camera traps, UAVs are widely used now.
  - Plenty of Imagery are collected.
 - CV techs is applicable from edge camera to cloud services.
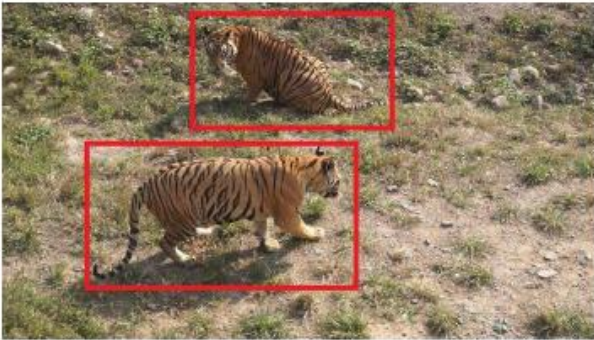
Prototype System Framework
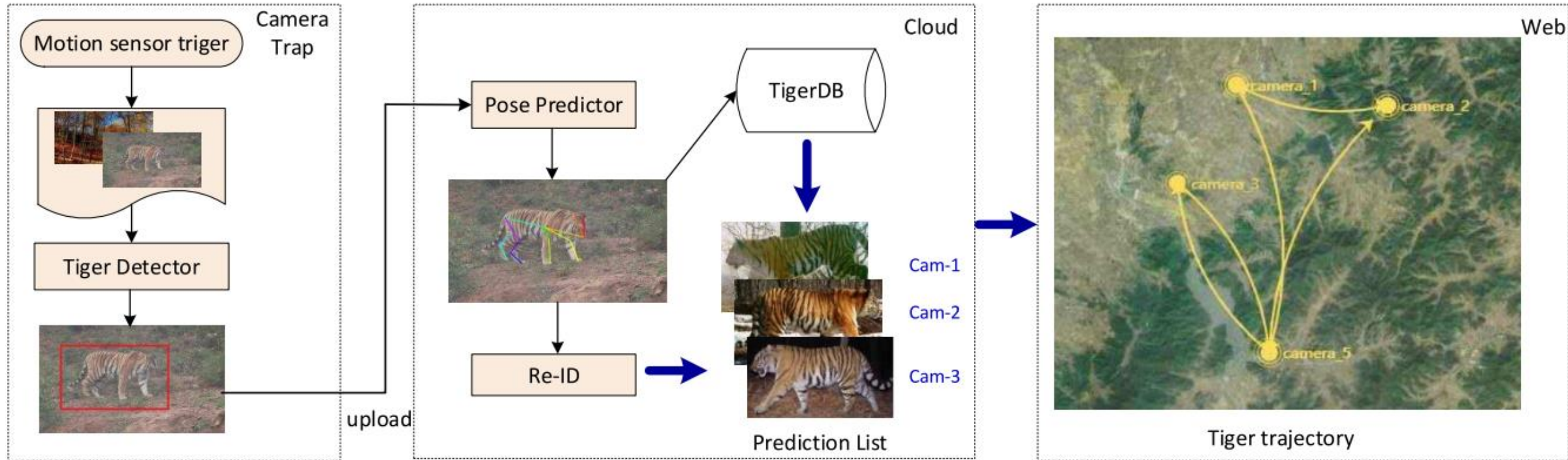
✓ Edge-side restrictions (battery, SD card size)
   ✓ Accurate to avoid useless image/video capturing
   ✓ Power efficient: small memory footprint, Efficient (lower FLOPs)
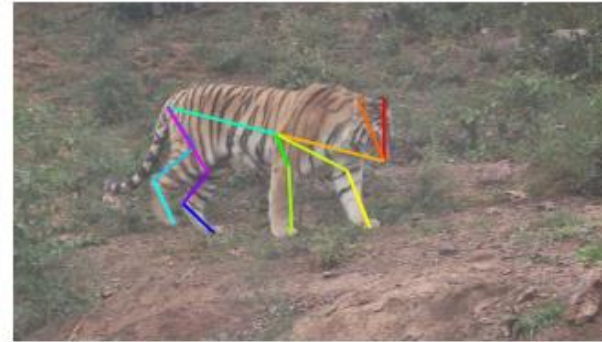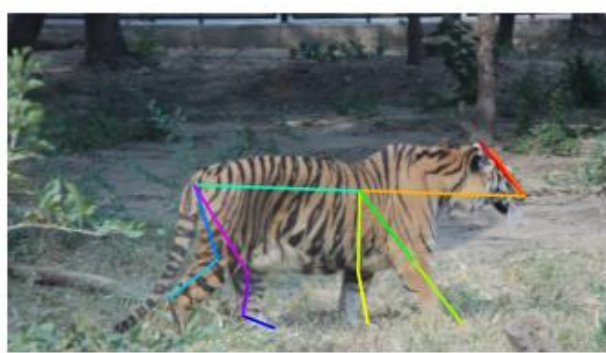
Data collection

- ~10 wild zoos in China with help of WWF and MakerCollider
- Time-synced surveillance cameras + tripod fixed SLR cameras

Bounding Box Annotations
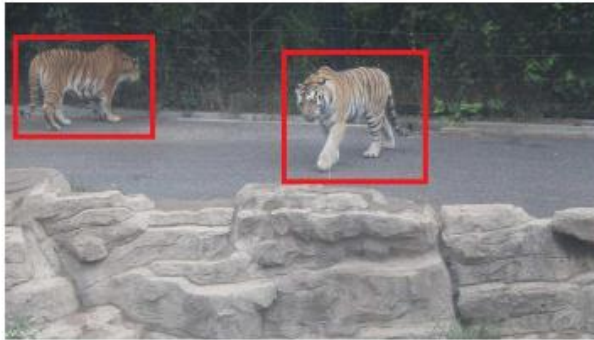
Pose Keypoints Annotations

Wildlife Re-ID dataset comparison

- ATRW is the largest, wild, rich annotated dataset

Datasets	**ATRW**	[20, 19]	C-Zoo[11]	C-Tai[11]	TELP[21]	α-whale[28]
Target	Tiger	Tiger	Chimpanzees	Chimpanzees	Elephant	Whale
Wild	✓	✓	×	×	×	✓
Pose annotation	✓	×	×	×	×	×
#Images or #Clips	8,076*	-	2,109	5,078	2,078	924
#BBoxes	9,496	-	2,109	5,078	2,078	924
#BBoxes with ID	3,649	-	2,109	5,078	2,078	924
#identities	92	298	24	78	276	38
#BBoxes/ID	39.7	-	19.9	9.7	20.5	24.3

Only a small portion extracted frames are annotated and used in the challenge.

ICCV 2019 Workshop & Challenge on

Computer Vision for Wildlife Conservation (CVWC)

Oct-27, 2019 @ Room-327A, COEX Convention Center, Seoul, Korea

ICCV 2019
Seoul, Korea

- Goal: Bring researchers in the community together to advance wildlife conservation using CV techniques from 3 aspects:
  - o Contributed papers
  - o Challenges
  - o Foster new ideas & directions with talks and panels

Advisory Board

Yoshua Bengio
MILA

Pietro Perona
Caltech

Lucas Joppa
Microsoft

Zhengyou Zhang
Tencent AI Lab

# Sponsorship and Support

- Dataset

- Workshop and Challenge

Challenge tasks & evaluation metrics

- Track-1 -- Tiger detection
  - Metric: a combination of mAP & FLOPs

- Track-2 -- Tiger pose estimation
  - Metric: OKS mAP

- Track-3 -- Re-ID with manual bbox + pose info
  - Metric: mAP for all test queries

- Track-4 -- Wild tiger re-identification (full automatic)
  - Metric: mAP for all test queries

Challenge by Numbers

- Tight timeline
  - Training data release: June 28, 2019
  - Testing data release: July 26, 2019
  - Result submission: August 3, 2019
  - Result notification: August 9, 2019
- Statistics
  - 29 teams, 63 register team members
  - Good coverage
    - US, European, India, China, …
    - 5 industrial related teams
  - 600+ submissions in one week

Submission per team
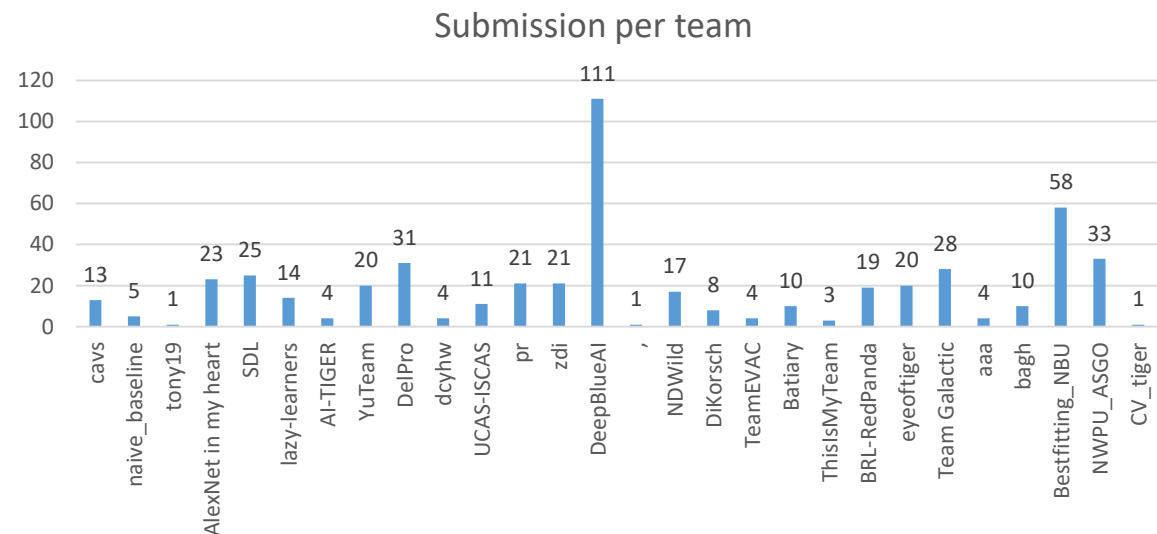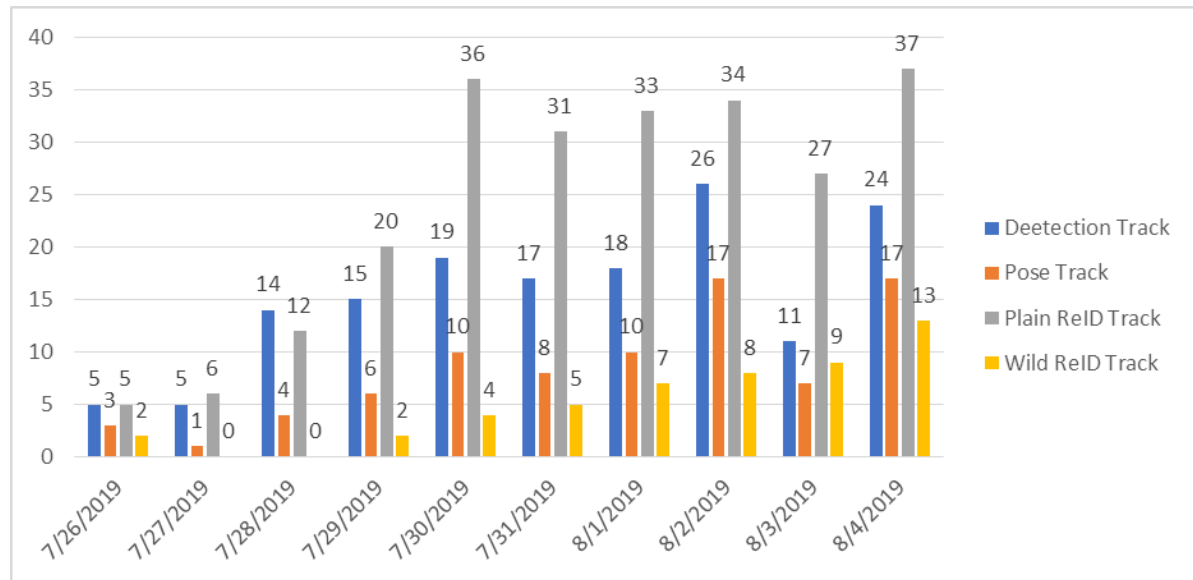
Challenge Award Certificate

1st place in Track-1: Tiger Detection

Orest Kupyn [1], *Dzmitry Pranchuk* [2]

Ukrainian Catholic University [1], WANNABY [2]

ICCV 2019 workshop on Computer Vision for Wildlife Conservation
Seoul, Korea, Oct 27, 2019

Workshop Chairs

| Jianguo Li | Weiyao Lin | Hanlin Tang | Greg Mori | Joachim Denzler |

Challenge Award Certificate

1st place in Track-2: Tiger Pose Detection

Zhipeng Luo, Zhenyu Xu, Bin Dong, Feng Ni, Yuehan Yao

DeepBlue Technology (Shanghai) Co. Ltd

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Challenge Award Certificate

1st place in Track-3&4: Tiger Re-ID in the Plain/Wild

Cen Liu, Linjun Guo, Rong Zhang

Ningbo University

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Google   CVWC   ICCV 2019 Seoul, Korea

Thanks!