

# High Performance Visual Tracking with Siamese Region Proposal Network

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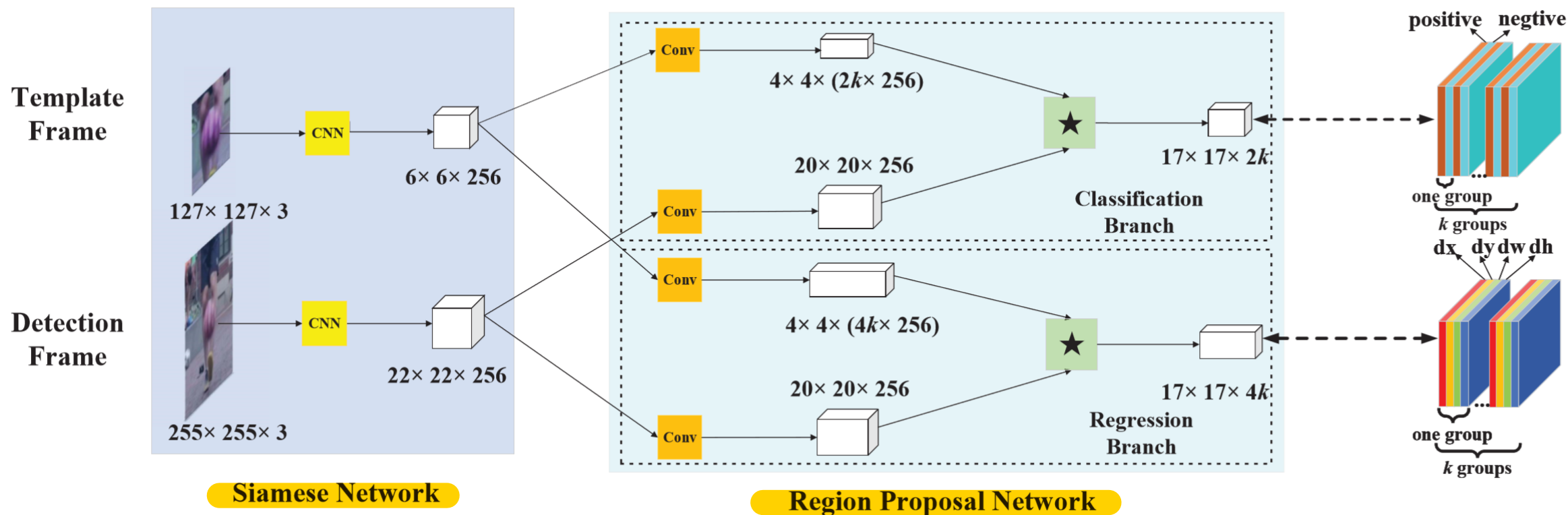
- Visual object tracking
  - Most trackers do not have regression network, which limit their ability to predict the shape of target during deformation, scale variance ..
  - Most trackers can not balance the accuracy and speed. Trackers with high performance can hardly track objects with real-time speed.



- We propose the Siamese region proposal network (SiameseRPN) which is end-to-end trained off-line with large-scale image pairs for the tracking task.
- During online tracking, the proposed framework is formulated as a local one-shot detection task, which can refine the proposal to discard the expensive multi-scale test.
- In experiments, Siamese RPN achieve leading performance in VOT2015, VOT2016 and VOT2017 real-time challenges with the speed of 160 FPS, which proves advantages in both accuracy and efficiency.

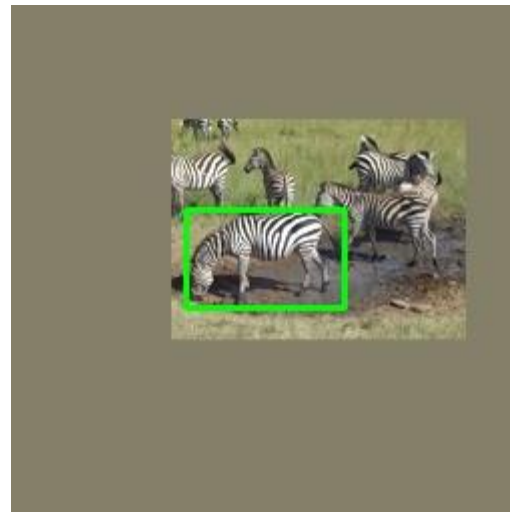
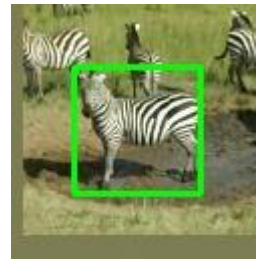


## High Performance Visual Tracking with Siamese Region Proposal Network

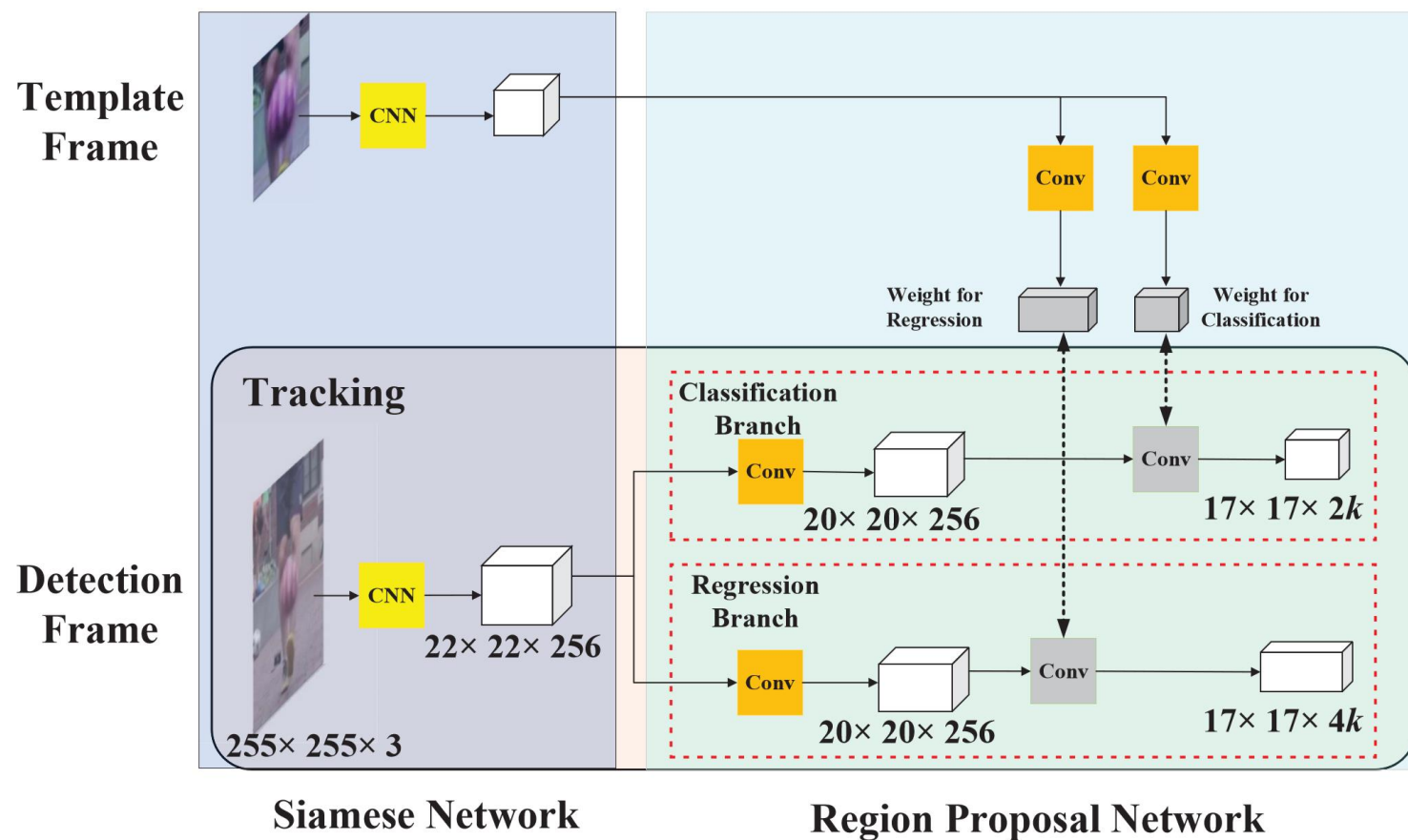


## Training data: VID+Youtube-BB

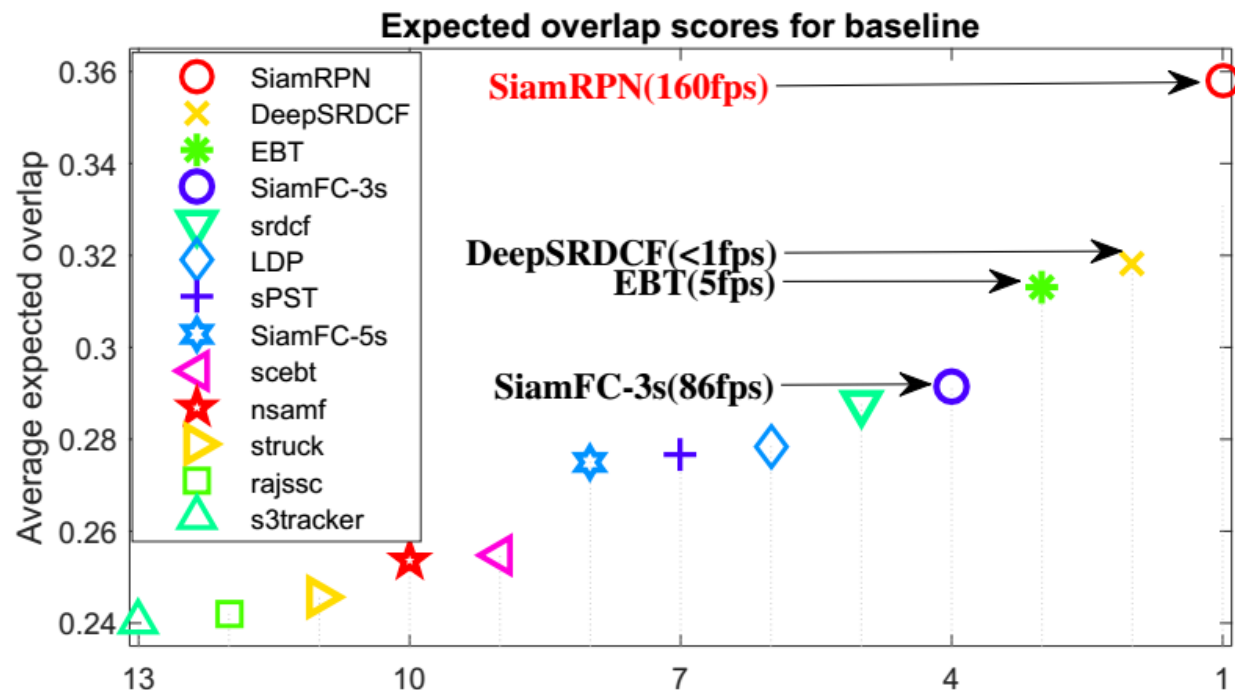
- ~4.5 k videos (VID)
- ~240 k videos (Youtube-BB)



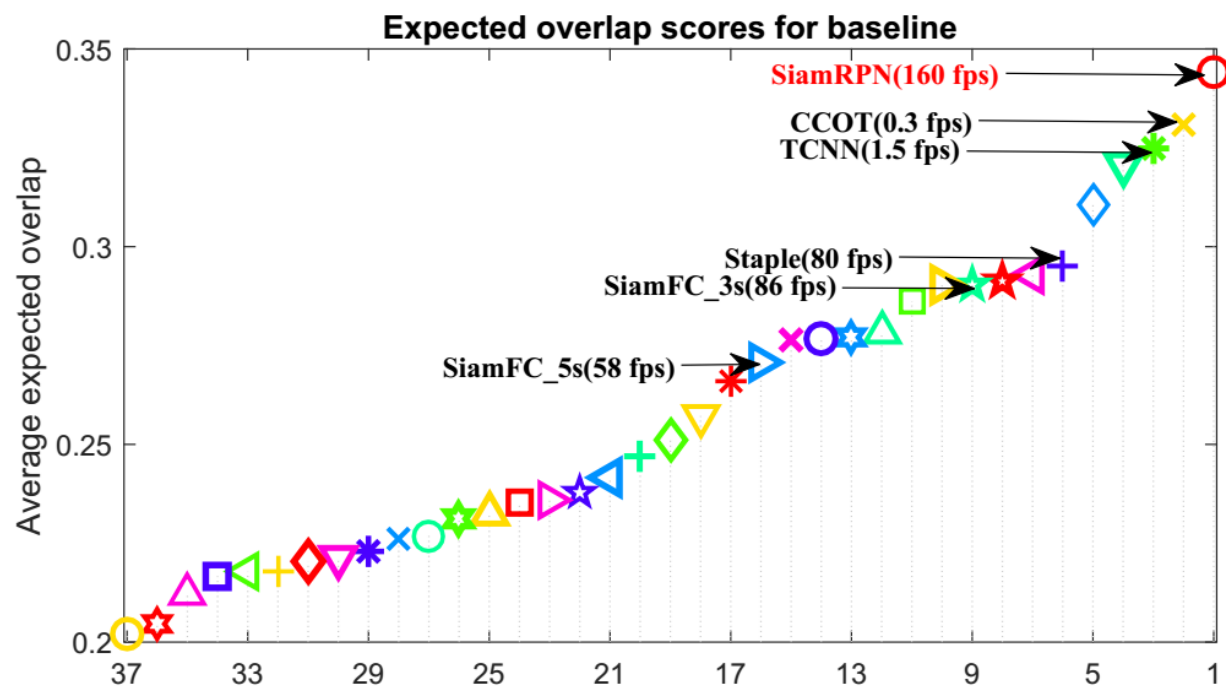
## Test Phase:





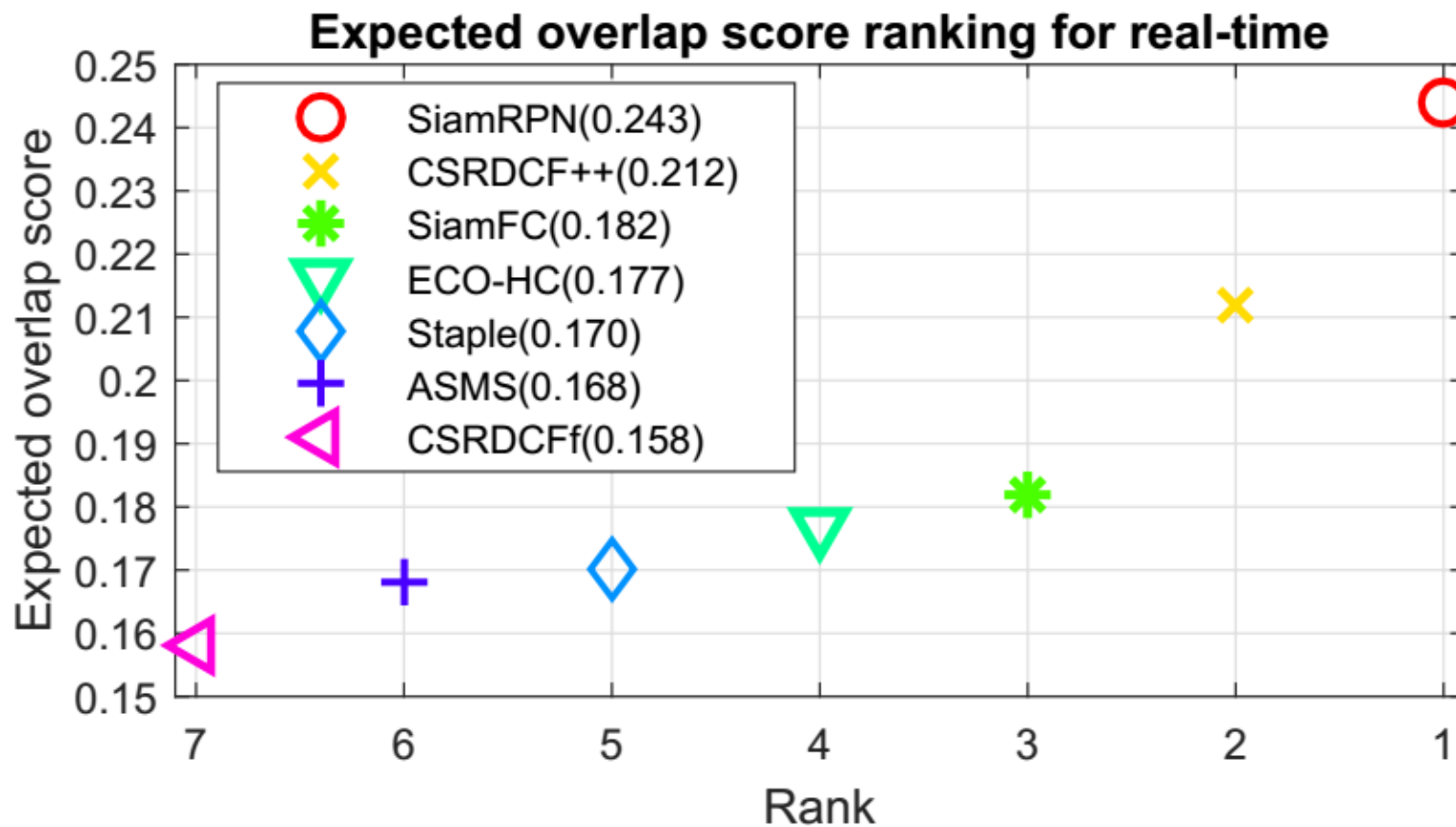


Tracker	EAO	Accuracy	Failure	EFO
<b>DeepSRDCF</b>	<i>0.3181</i>	<i>0.56</i>	<i>1.0</i>	0.38
<b>EBT</b>	<i>0.313</i>	0.45	<i>1.02</i>	1.76
<b>SRDCF</b>	0.2877	0.55	1.18	1.99
<b>LDP</b>	0.2785	0.49	1.3	4.36
<b>sPST</b>	0.2767	0.54	1.42	1.01
<b>SC-EBT</b>	0.2548	0.54	1.72	0.8
<b>NSAMF</b>	0.2536	0.53	1.29	5.47
<b>Struck</b>	0.2458	0.46	1.5	2.44
<b>RAJSSC</b>	0.242	<i>0.57</i>	1.75	2.12
<b>S3Tracker</b>	0.2403	0.52	1.67	<i>14.27</i>
<b>SiamFC-3s</b>	0.2915	0.54	1.42	<i>8.68</i>
<b>SiamFC-5s</b>	0.275	0.53	1.45	7.84
<b>SiamRPN</b>	<i>0.358</i>	<i>0.58</i>	<i>0.93</i>	<i>23.0</i>



Tracker	EAO	Accuracy	Failure	EFO
C-COT	0.331	0.53	0.85	0.507
ECO-HC	0.322	0.53	1.08	15.13
Staple	0.2952	0.54	1.35	11.14
EBT	0.2913	0.47	0.9	3.011
MDNet_N	0.257	0.54	1.2	0.534
SiamRN	0.2766	0.55	1.37	5.44
SiamAN	0.2352	0.53	1.65	9.21
SiamRPN	0.3441	0.56	1.08	23.3





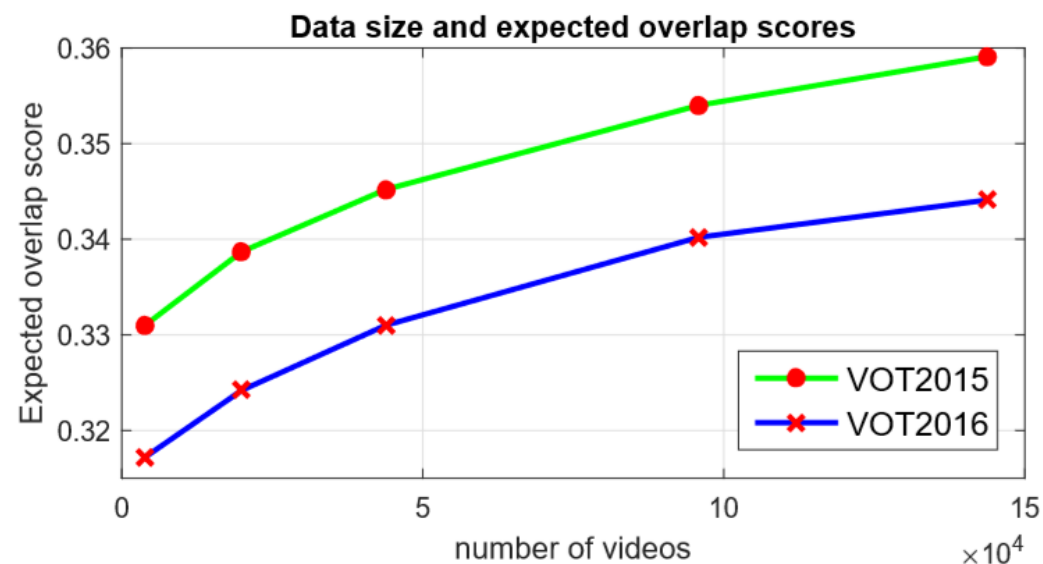
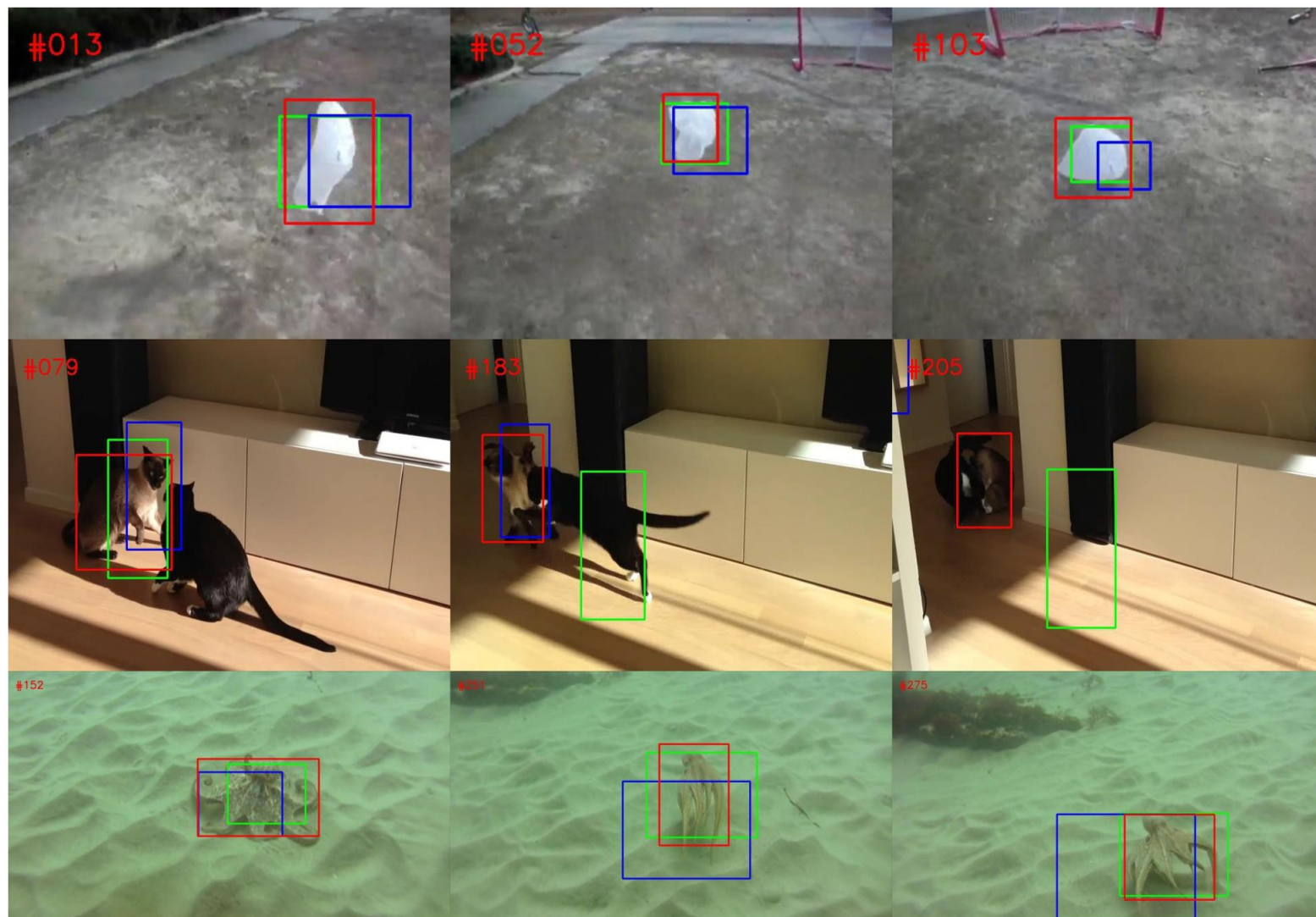


Figure 10: Effects of using increasing number of videos from ILSVRC [29] and Youtube-BB [25] on performance of tracker. Adding data from Youtube-BB can boost the performance gradually. Performance is not saturated, which means tracker performance may become better with more training data.



# Qualitative result



— SiamRPN

— CCOT

— SiamFC



# Thanks for listening

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