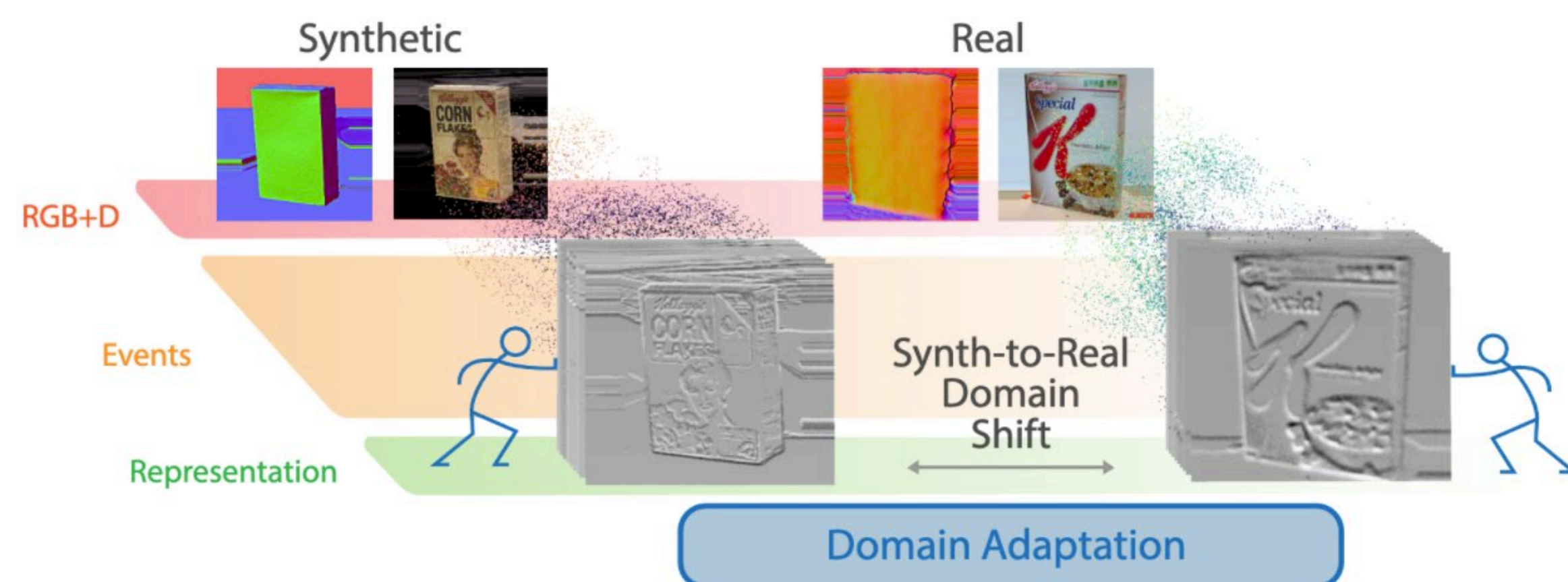


Motivation

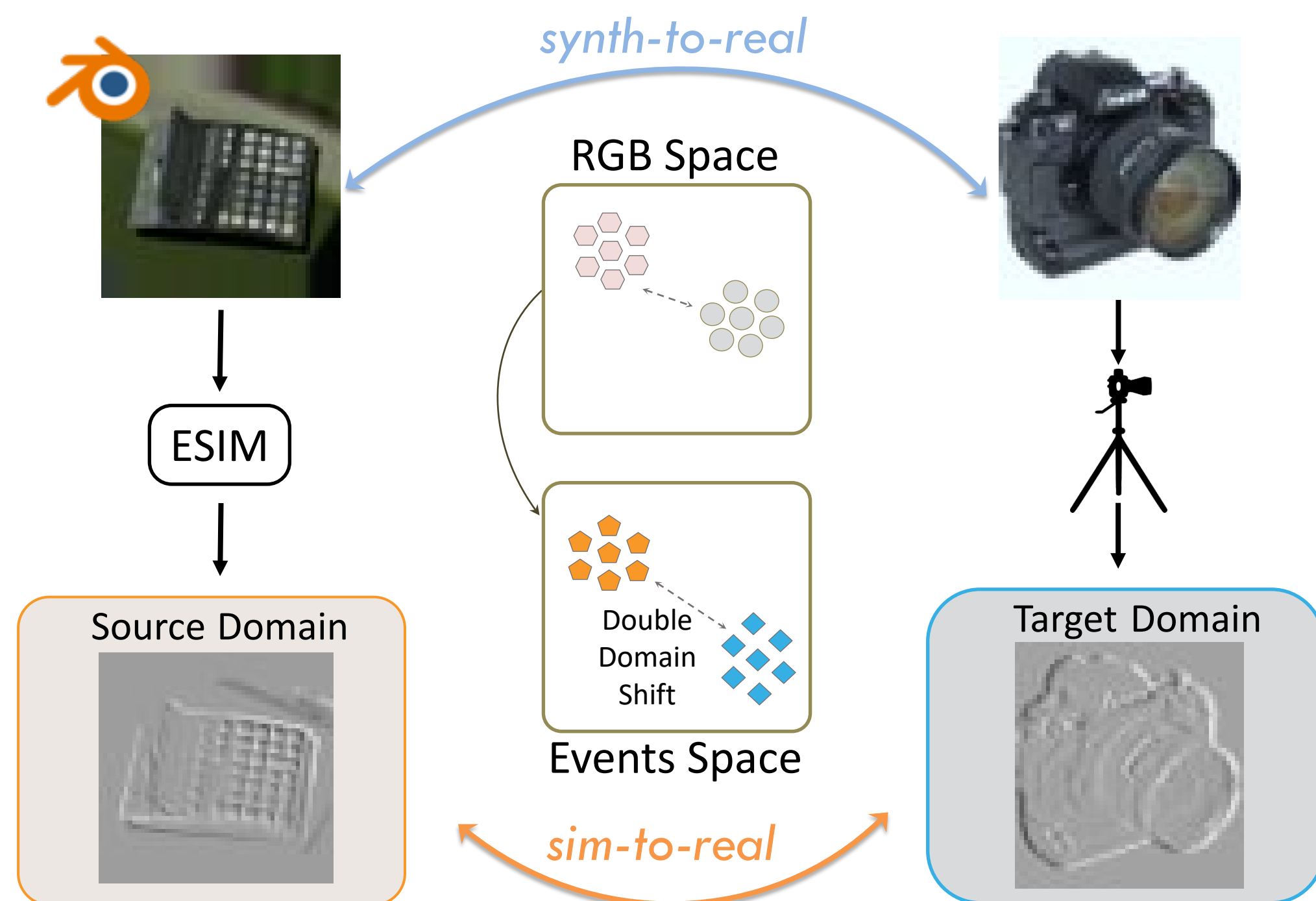
How can we study the Synth-to-Real gap in event-based cameras?

- We propose N-ROD, a new dataset designed for supporting research in domain adaptive event-based classification, in both single and multi-modal settings.



Synthetic-to-Real Scenario

Double domain-shift: it combines the synth-to-real shift on RGB images and the sim-to-real shift on events.



N-ROD



ROD [2]:

300 daily objects grouped in 51 categories, 41'877 samples with RGB-D data.

SynROD [3]:

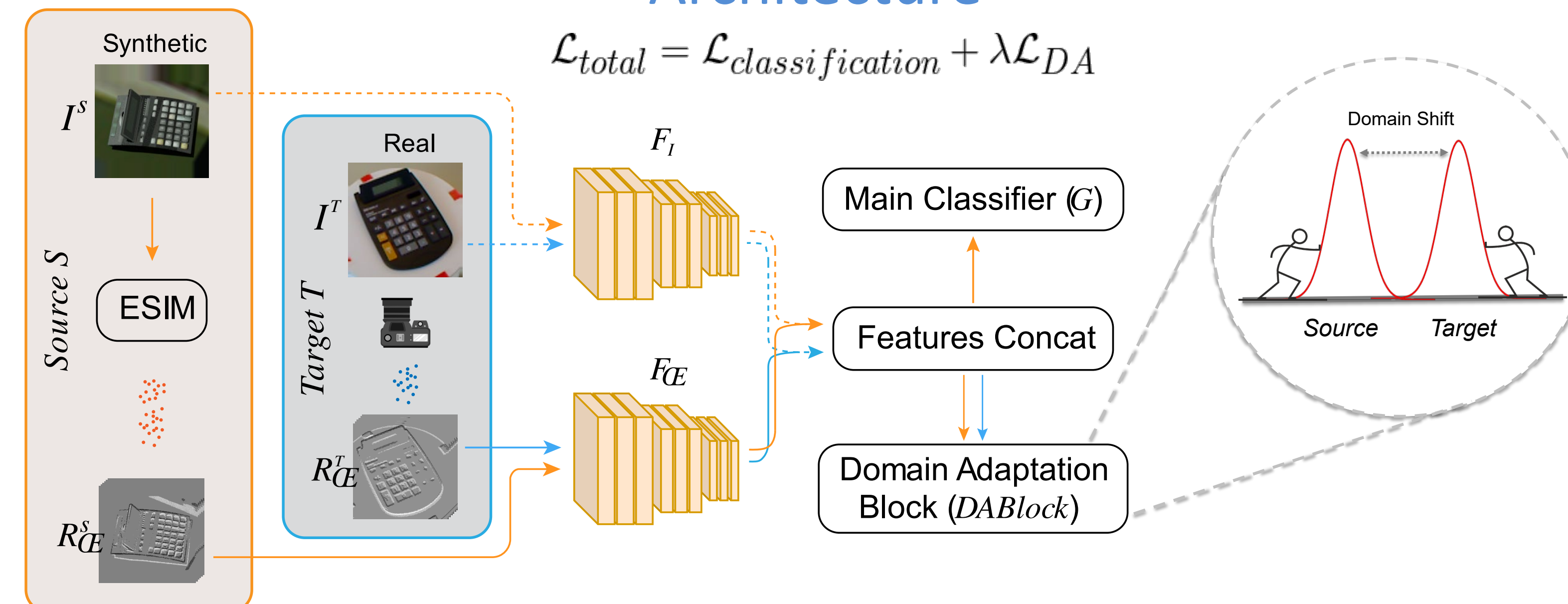
3D models from the same ROD categories, synthetic RGB and depth renderings.

NEW N-ROD:

Real event: Saccadic motion [1] / Real RGB images recorded with Prophesee HVGA Gen3

Simulated events: Event simulation through ESIM [1] / Virtual camera performing same saccadic motion

Architecture



Results

Unsupervised Domain Adaptation (UDA) techniques are effective in bridging the synth-to-real gap.

Method	SYNTH-N-ROD \Rightarrow N-ROD			Multi-modal	
	RGB	Depth	Event	RGB+D	RGB+E
Source Only	52.13	7.56	21.78	47.70	50.78
GRL [10]	57.12	26.11	33.09	59.51	57.15
MMD [20]	63.68	29.34	42.05	62.57	61.78
Rot [34][19]	63.21	6.70	31.26	<u>66.68</u>	<u>68.54</u>
AFN [35]	<u>64.63</u>	<u>30.72</u>	<u>55.12</u>	62.40	64.04
Entropy [13]	61.53	16.79	50.14	63.12	64.08
Avg	62.03	21.93	42.33	62.86	63.12
	$\uparrow +9.9$	$\uparrow +14.4$	$\uparrow +20.6$	$\uparrow +15.2$	$\uparrow +12.3$

UDA methods

Bibliography

- Gehrig, Daniel, et al. "Video to events: Recycling video datasets for event cameras." CVPR, 2020
- Lai, Kevin, et al. "A large-scale hierarchical multi-view rgb-d object dataset." ICRA, 2011
- Loghmani, Mohammad Reza, et al. "Unsupervised Domain Adaptation through Inter-modal Rotation for RGB-D Object Recognition." RA-L, 2020

Dataset Available

<https://n-rod-dataset.github.io/home/>

SCAN FOR DATASET

