Ego-Only: Egocentric Action Detection without Exocentric Transferring

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Meta AI

ICCV 2023, Paris

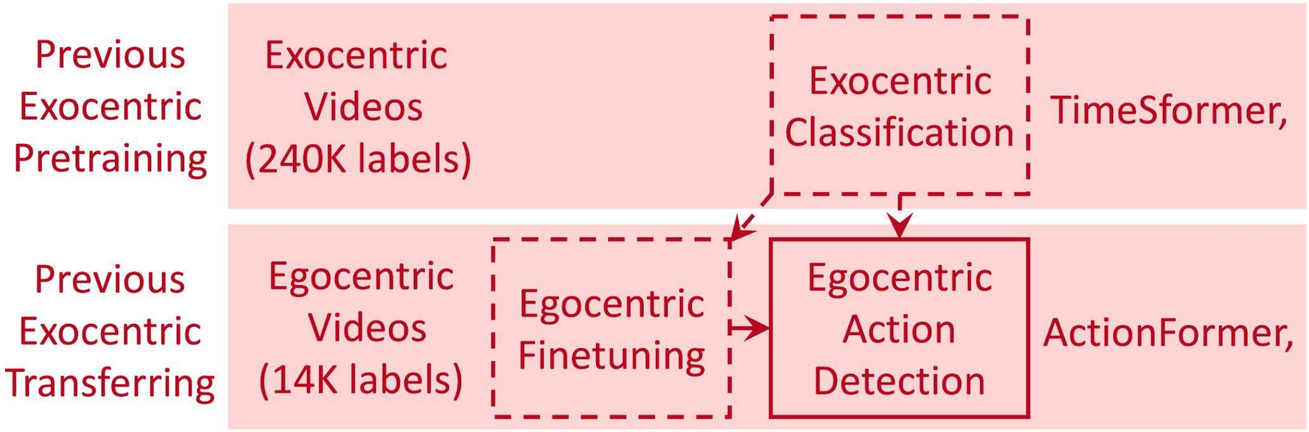
Meta AI

Goal

Detect human actions: (class, start, end)

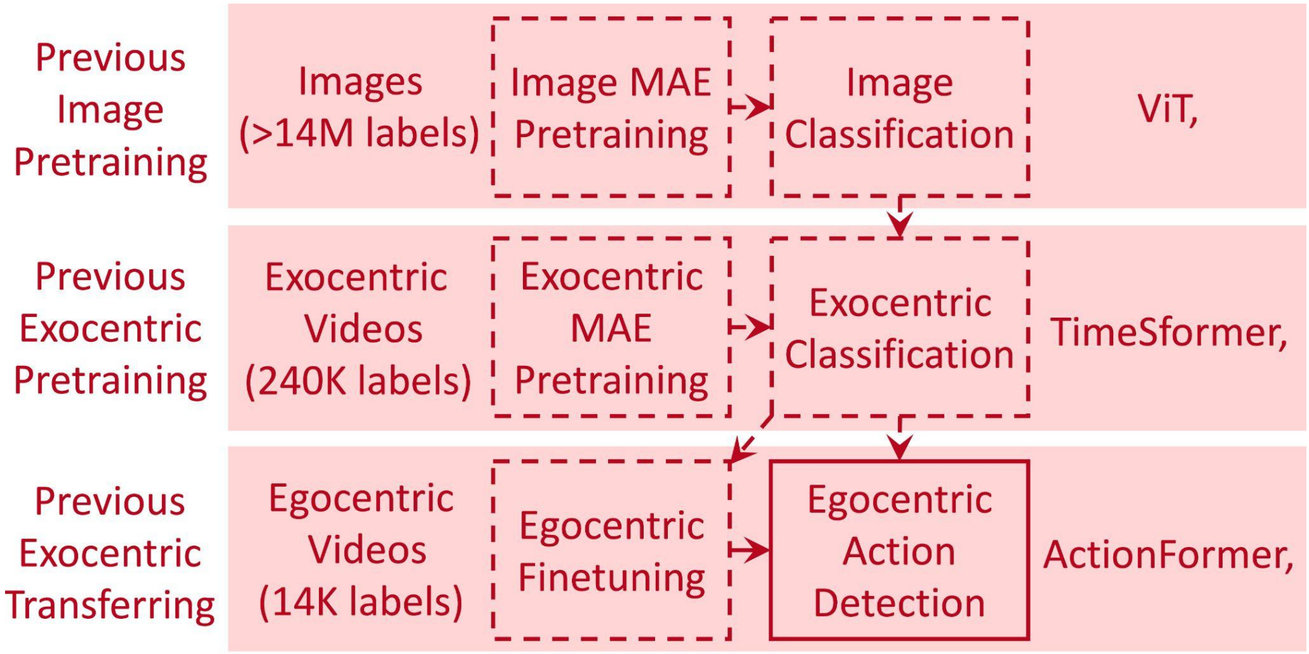
Grauman, K., et al. Ego4d: Around the world in 3,000 hours of egocentric video. CVPR 2022.

Exocentric Transferring



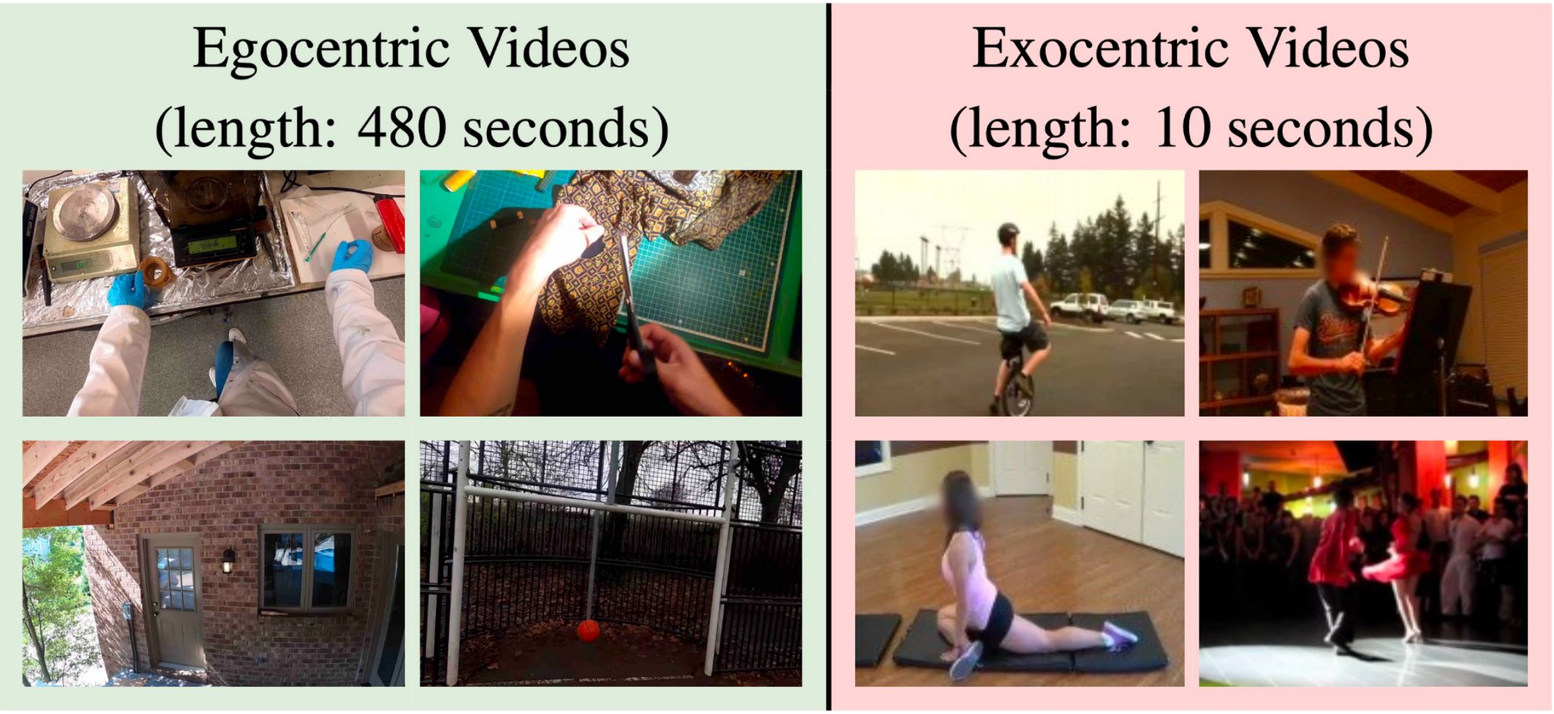
Kay, W., et al. The kinetics human action video dataset. ArXiv 2017.
Bertasius, G., et al. Is space-time attention all you need for video understanding? ICML 2021.
Zhang, C., et al. Actionformer: Localizing moments of actions with transformers. ECCV 2022.

Exocentric Transferring



Deng, J., et al. Imagenet: A large-scale hierarchical image database. CVPR 2009.
Dosovitskiy, A., et al. An image is worth 16x16 words: Transformers for image recognition at scale. ICLR 2021.
He, K., et al. Masked autoencoders are scalable vision learners. CVPR 2022.

Challenging to Transfer



- No actor in view
- Object interaction
- Domain shift
- Class granularity
- Long-tail
- Long-form
- Localization

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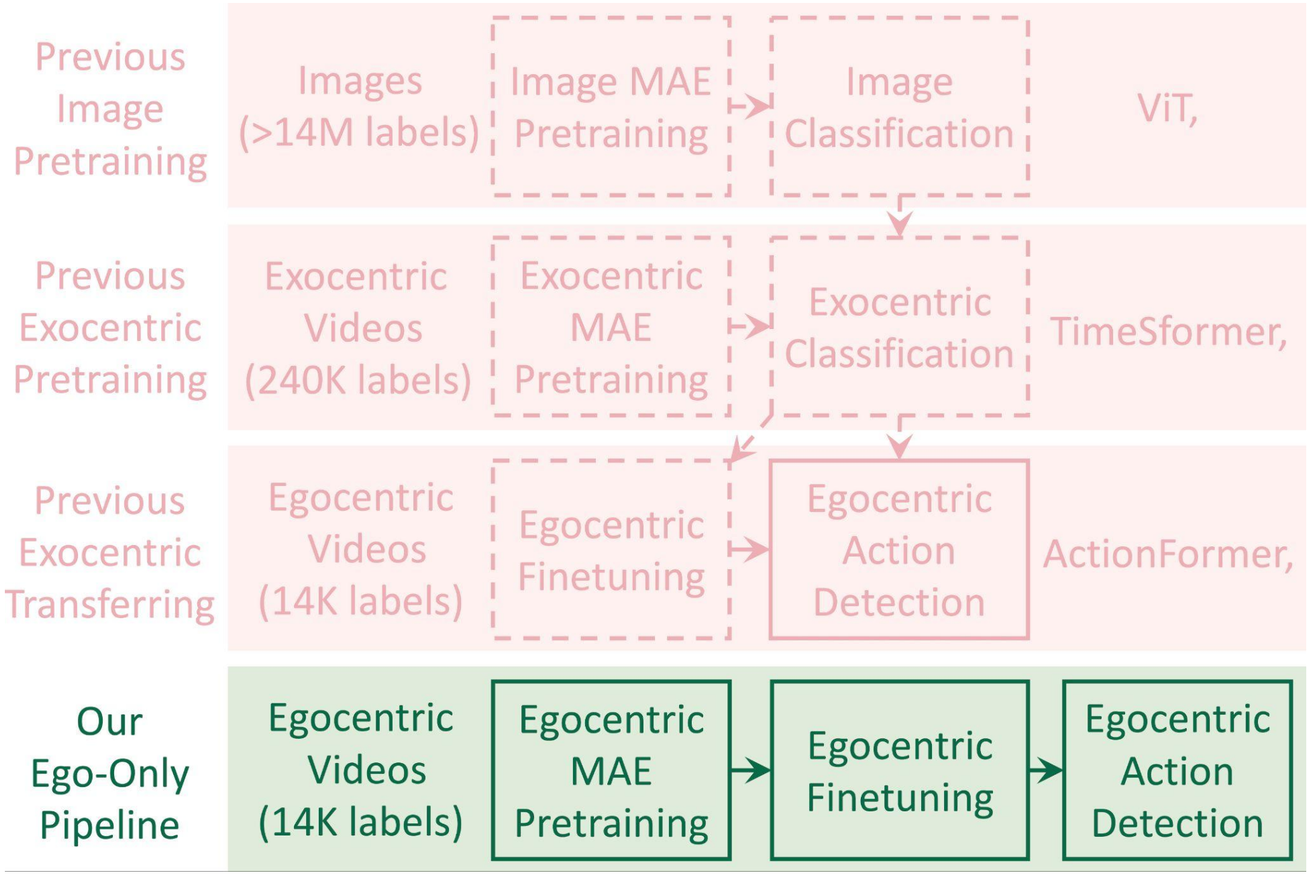
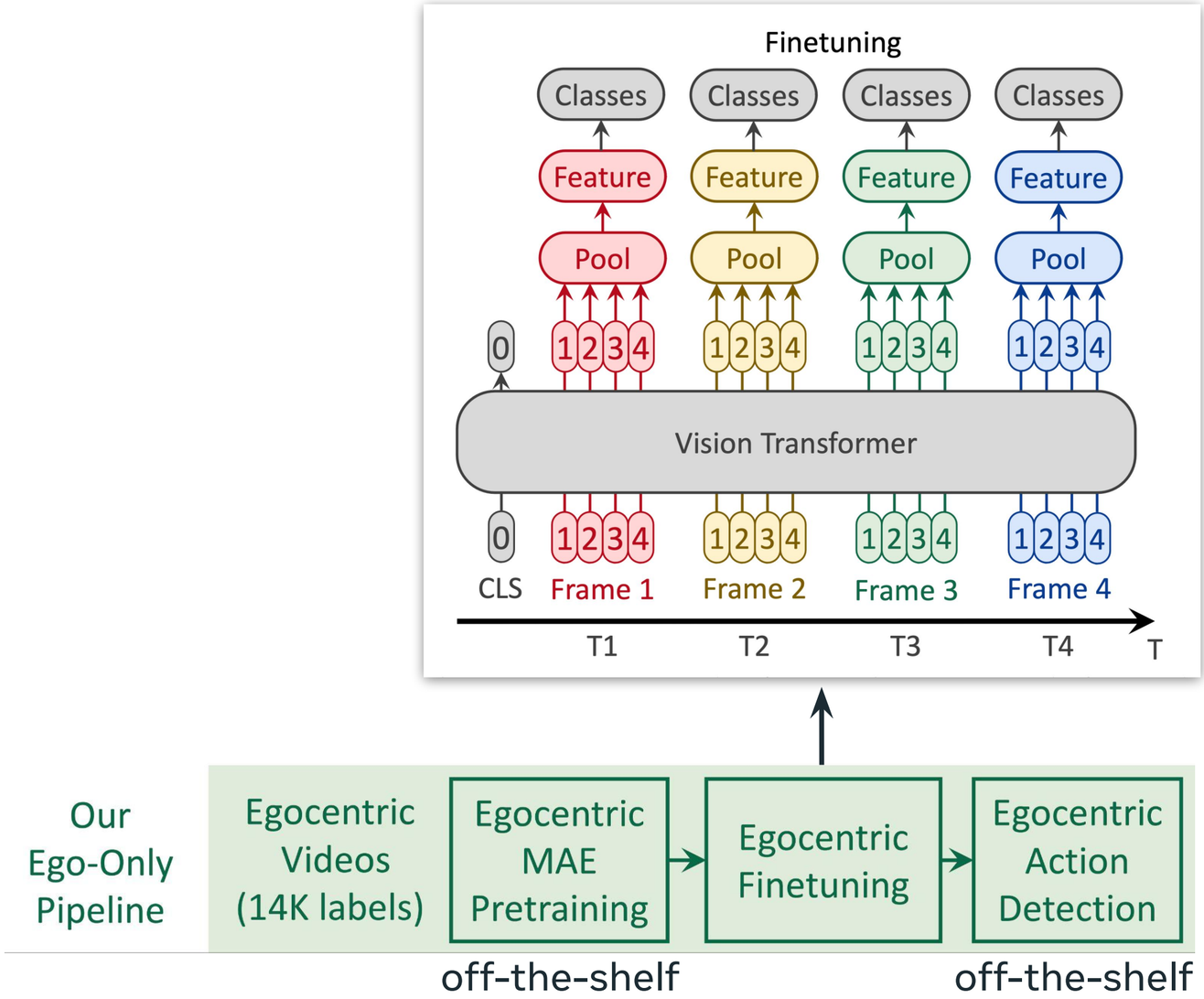
Ego-Only



better

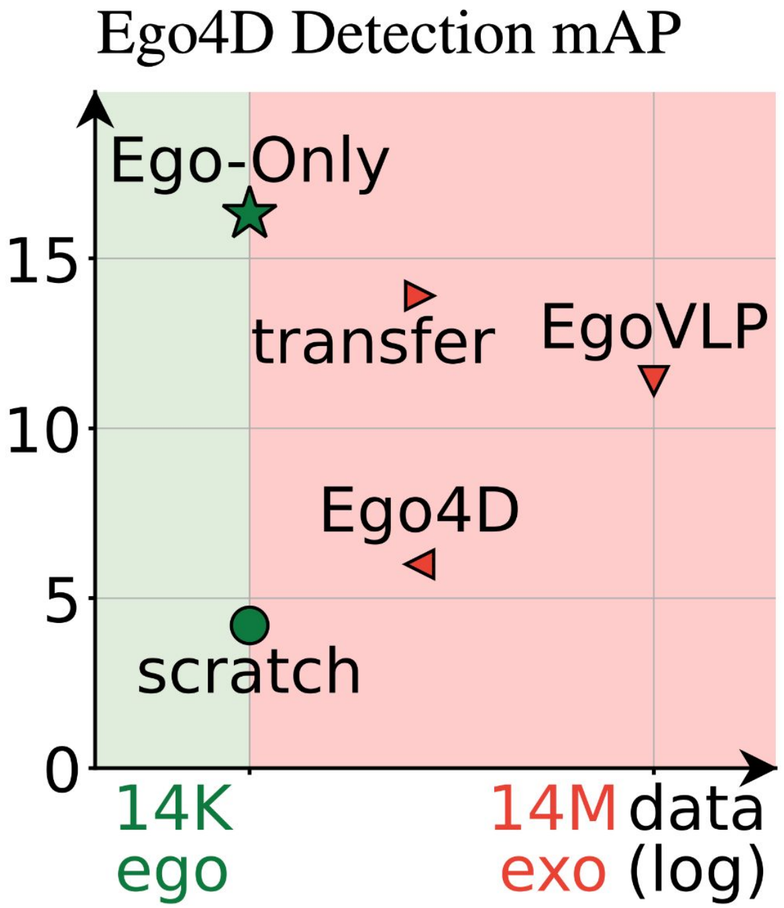
with sufficient supervision

Ego-Only

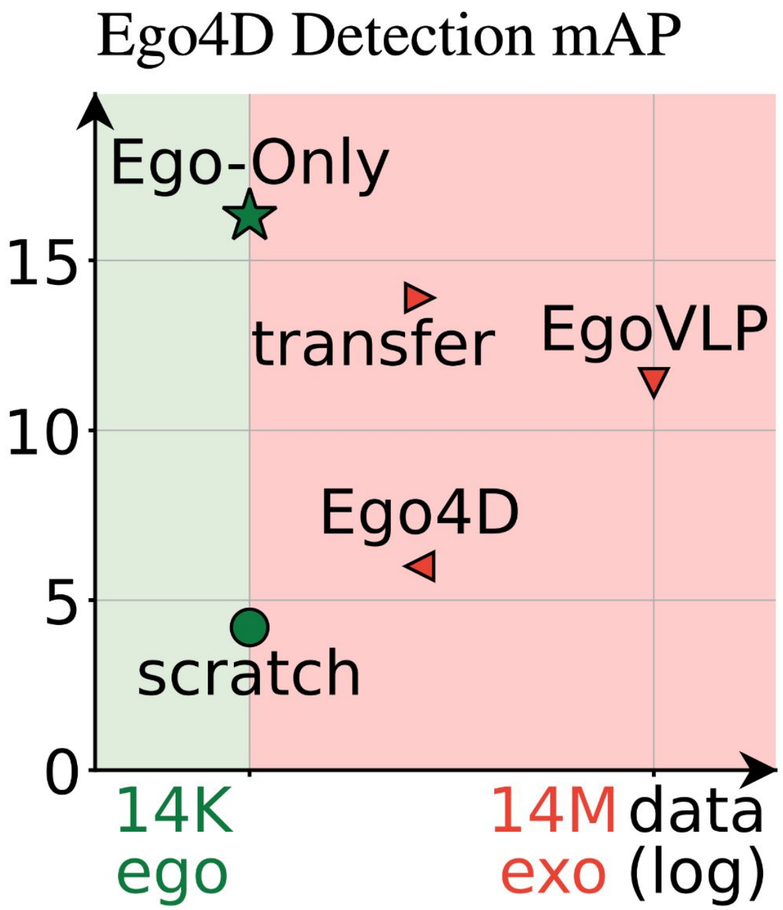


Feichtenhofer, C., et al. Masked autoencoders as spatiotemporal learners. NeurIPS 2022.
Zhang, C., et al. Actionformer: Localizing moments of actions with transformers. ECCV 2022.

Results


Ego4D Detection mAP
Ego-Only
transfer
EgoVLP
Ego4D
scratch
15
10
5
0
14K
ego
14M
exo
data
(log)

Results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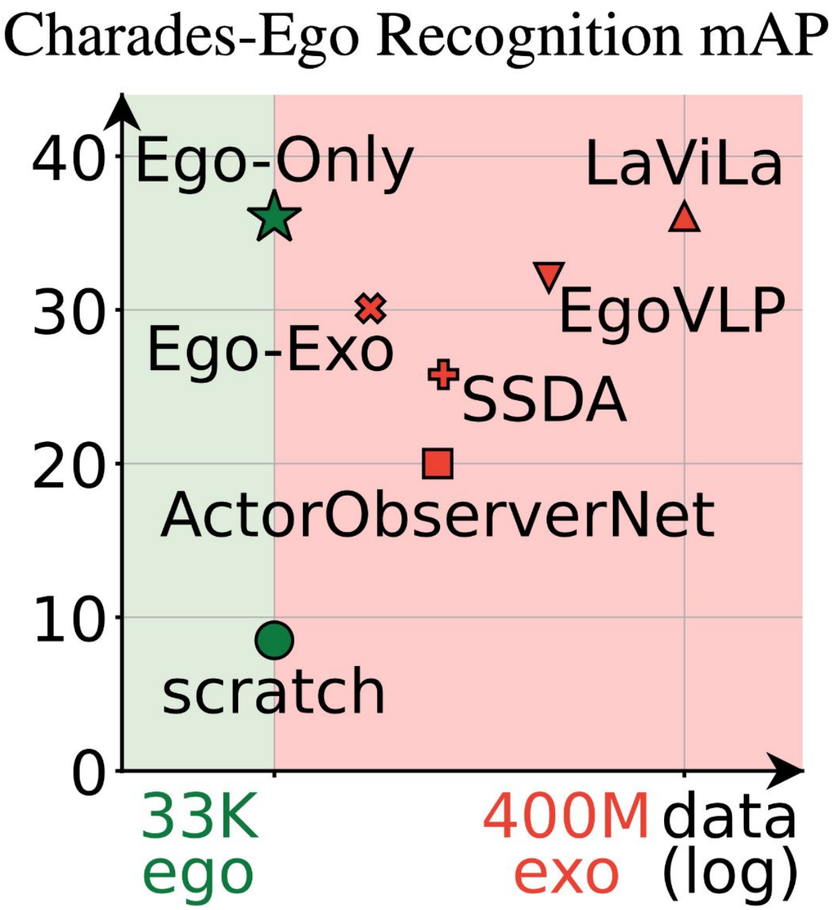
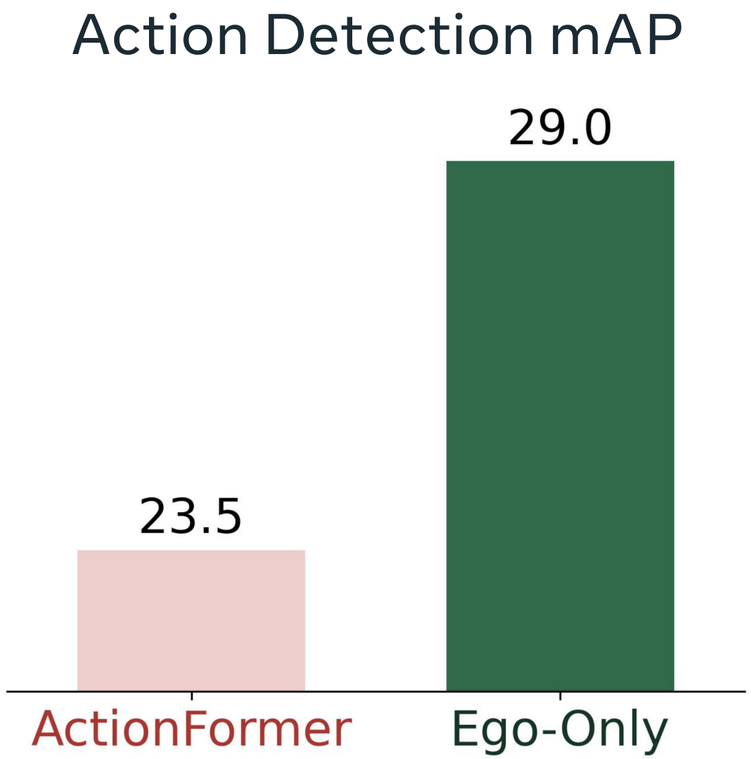

Charades-Ego Recognition mAP
Ego-Only
LaViLa
EgoVLP
Ego-Exo
SSDA
ActorObserverNet
scratch
40
30
20
10
0
33K
ego
400M
exo
data
(log)

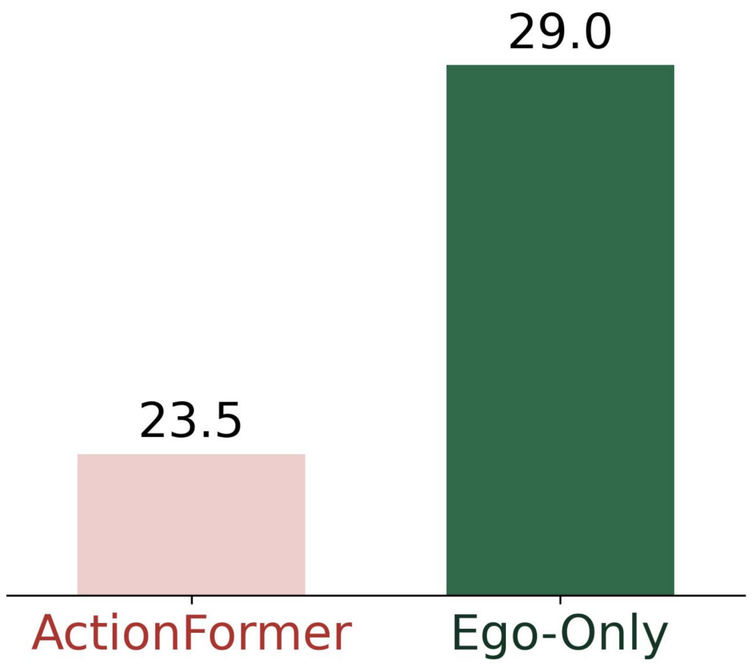
EPIC-Kitchens-100



Damen, D., et al. Rescaling egocentric vision: collection, pipeline and challenges for epic-kitchens-100. IJCV 2022.
Zhang, C., et al. Actionformer: Localizing moments of actions with transformers. ECCV 2022.

EPIC-Kitchens-100

Action Detection mAP



Action Recognition Top-1

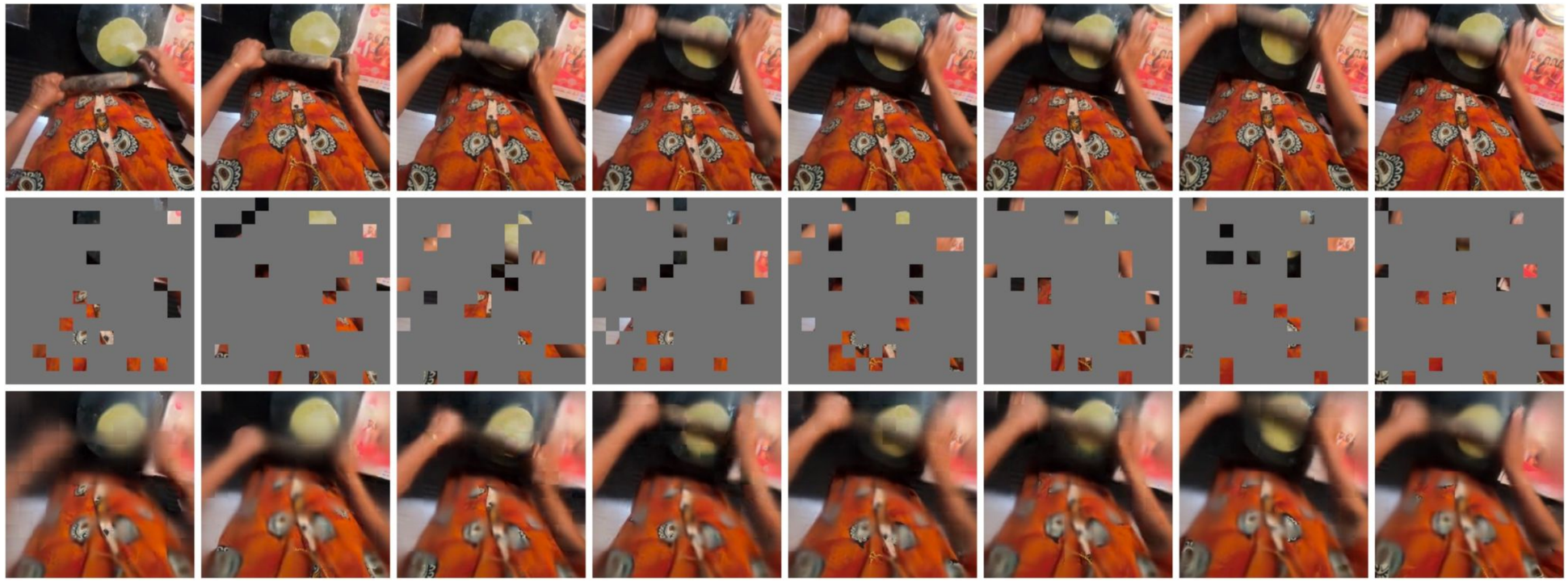
method	variant	verb	noun
ViViT	ViViT-L/16x2, IN-21k+K400	66.4	56.8
MoViNet	MoViNet-A6, 120 frames	72.2	57.3
MTV	MTV-B, WTS-60M, 280p	69.9	63.9
MTCN	MFormer-HR, IN-21k+K400+VGG-Sound	70.7	62.1
Omnivore	Swin-B, IN21k+IN-1k+K400+SUN	69.5	61.7
MeMViT	MeMViT, 32×3, K600, 105.6 sec	71.4	60.3
LaViLa	TSF-L, WebImageText+Ego4D	72.0	62.9
Ego-Only	ViT-L, 32 frames, 3.2 sec	**73.3**	59.4

MAE Reconstruction

Original

Masked

Prediction



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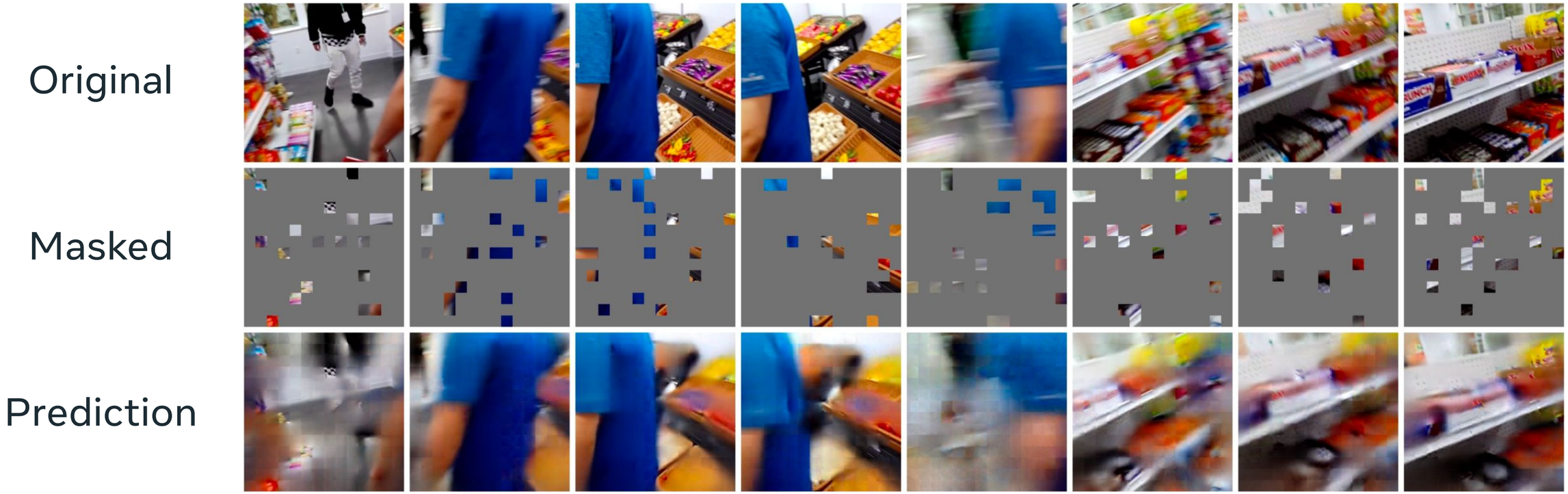

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Summary

1. Ego-Only can be trained **without exocentric transferring**
2. Ego-Only is an order of magnitude more **label-efficient**
3. Ego-Only **improves** results over the state-of-the-art