

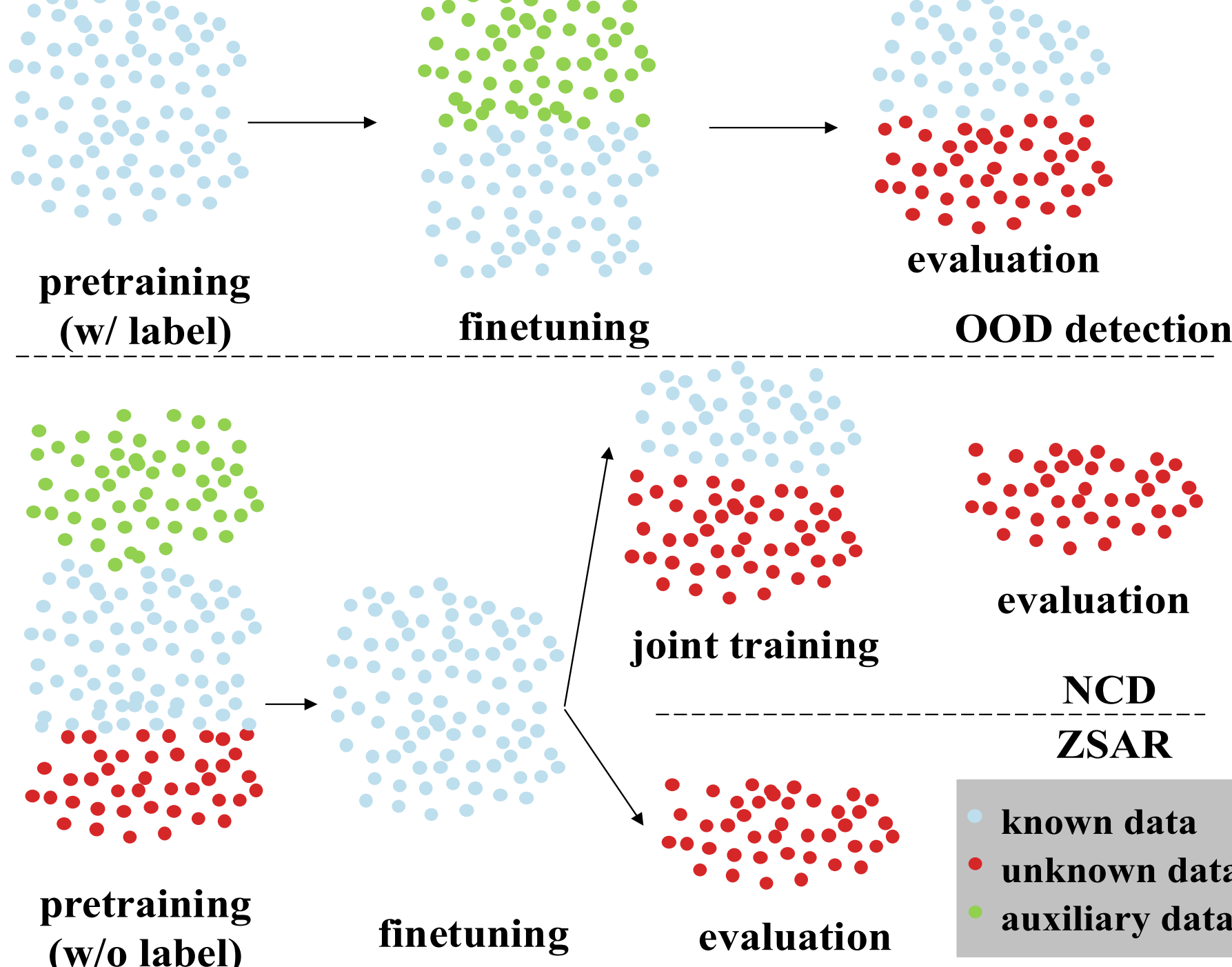
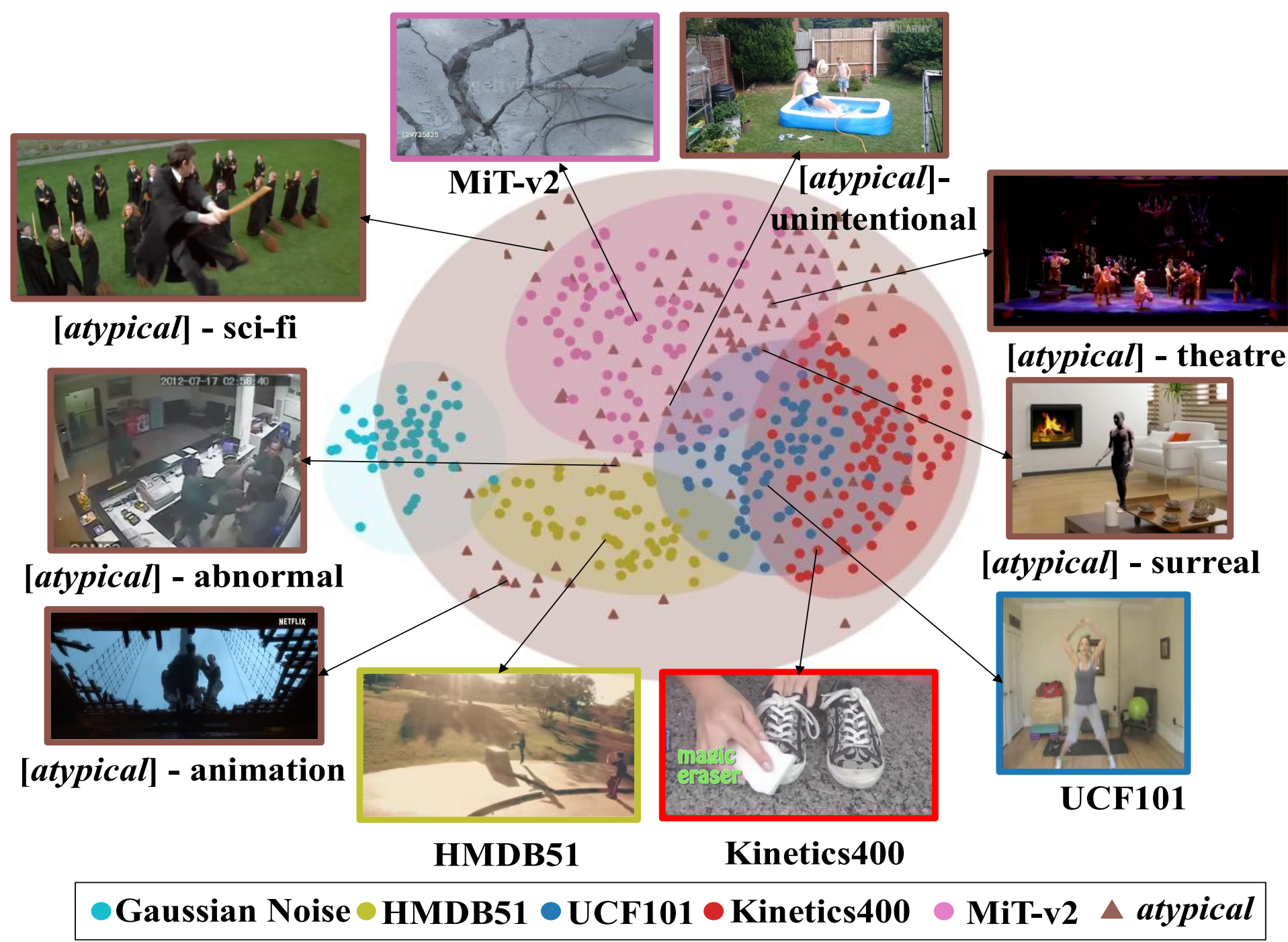
What Can We Learn from Harry Potter? An Exploratory Study of Visual Representation Learning from Atypical Videos

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Motivation



Paper Project

- Humans generalize well from *uncommon* experiences — can models do the same?
- Existing studies focus on *typical closed-set videos*.
- Atypical/unusual* videos remain *under-explored* for open-world learning.
- Investigate whether *atypical videos* improve open world tasks (*OOD, NCD, ZSAR*).

Atypical datasets



Table 1. Statistical details of the proposed *atypical* video dataset

Category	# Videos	Avg duration	Data Source
Sci-fi	1,119	4.00s	YouTube film trailers
Animation	1,058	4.04s	YouTube animated trailers
Unintentional	2,835	9.77s	Oops Dataset [7]
Abnormal	1,103	7.53s	Ped2 [24], CUHK Avenue [23], UCF-Crime [35]
Surreal	1,024	3.18s	Surreal dataset [37]
Theatre	679	4.81s	YouTube stage performances
<i>atypical</i>	7,818	5.70s	Diverse sources

Table 2. Data splits for open world learning

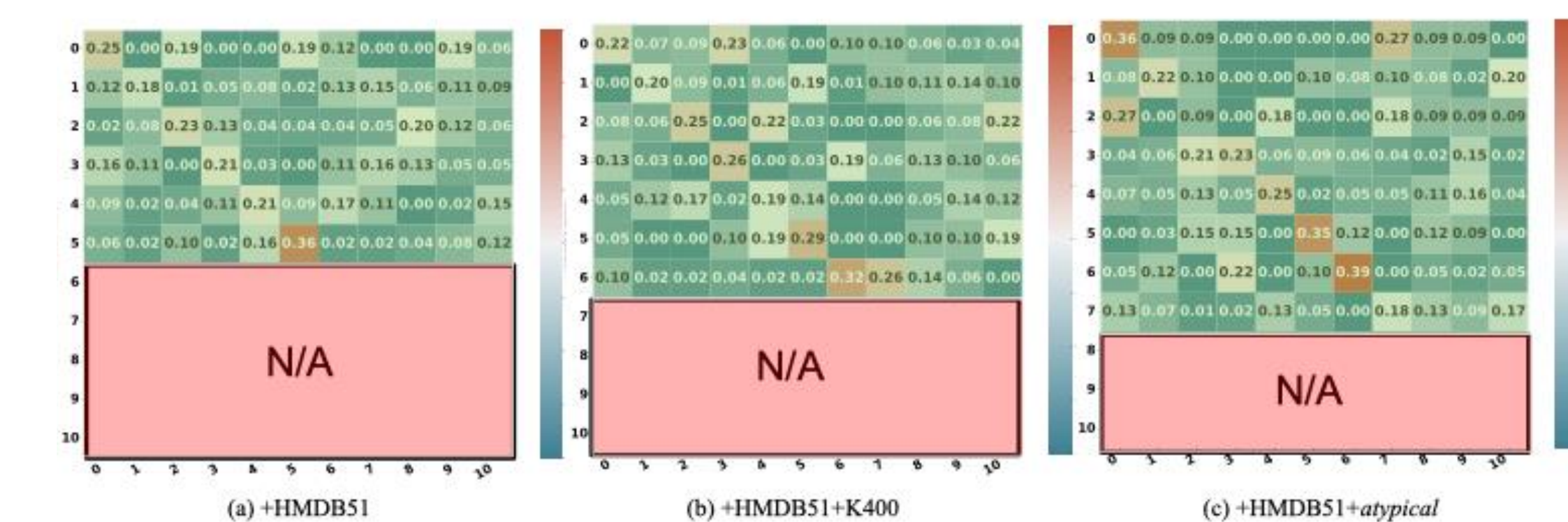
Task	Known	Unknown	Auxiliary
OOD detection	UCF101	HMDB51, MiT-v2, [atypical]-surreal, [atypical]-theatre	Gaussian Noise, Diving48, Kinetics400, <i>atypical</i>
NCD /ZSAR	UCF_80, HMDB_40	UCF_21, HMDB_11	UCF101 / HMDB51, Kinetics400, <i>atypical</i>

Experiments

OOD detection

Dataset	Metric	Baseline	+Gaussian	+Diving48	+K400	+Atypical
HMDB51	FPR95 ↓	77.08	81.11	81.14	75.52	73.07
	AUROC ↑	63.85	63.36	64.84	66.84	69.43
	AUPR ↑	22.54	23.03	24.04	25.13	27.07
MiT-v2	FPR95 ↓	77.73	77.51	80.87	67.72	66.62
	AUROC ↑	64.94	65.14	65.46	72.53	74.01
	AUPR ↑	23.76	24.12	27.24	30.86	32.59
[atypical]-surreal	FPR95 ↓	62.22	67.37	73.14	53.66	49.99
	AUROC ↑	75.50	73.32	69.13	79.78	82.03
	AUPR ↑	33.42	32.26	25.71	39.13	43.19
[atypical]-theatre	FPR95 ↓	79.75	80.71	82.66	66.41	61.91
	AUROC ↑	61.80	63.95	60.05	71.29	74.62
	AUPR ↑	20.34	21.97	19.04	27.17	34.57
MEAN	FPR95 ↓	74.20	76.68	79.45	65.83	62.90
	AUROC ↑	66.52	66.44	64.87	72.61	75.02
	AUPR ↑	25.02	25.35	24.01	30.62	34.36

Novel category discovery

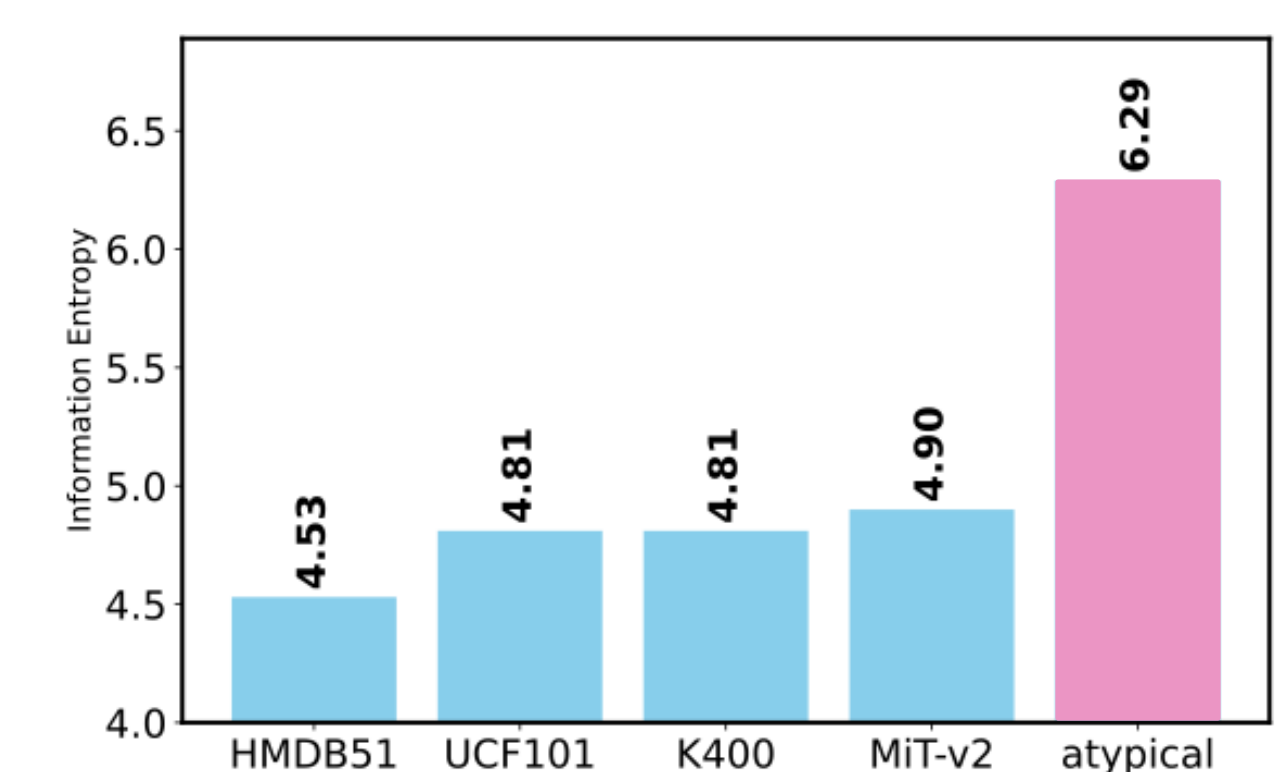
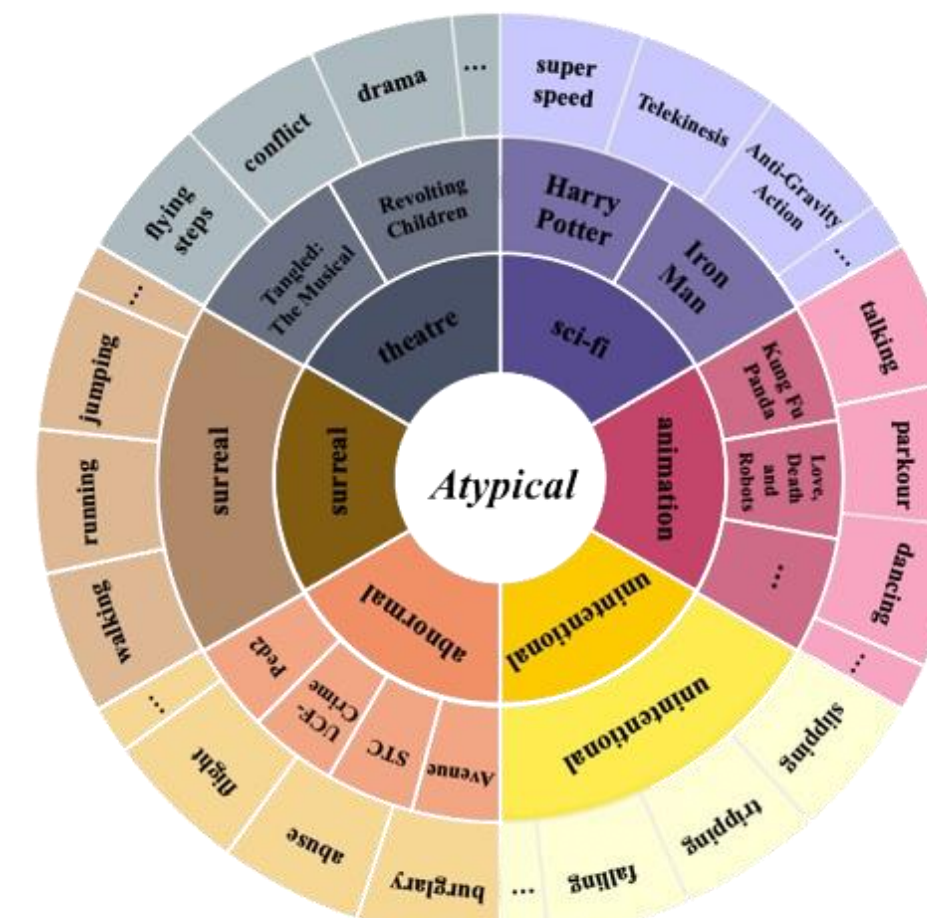


Zero-shot action recognition

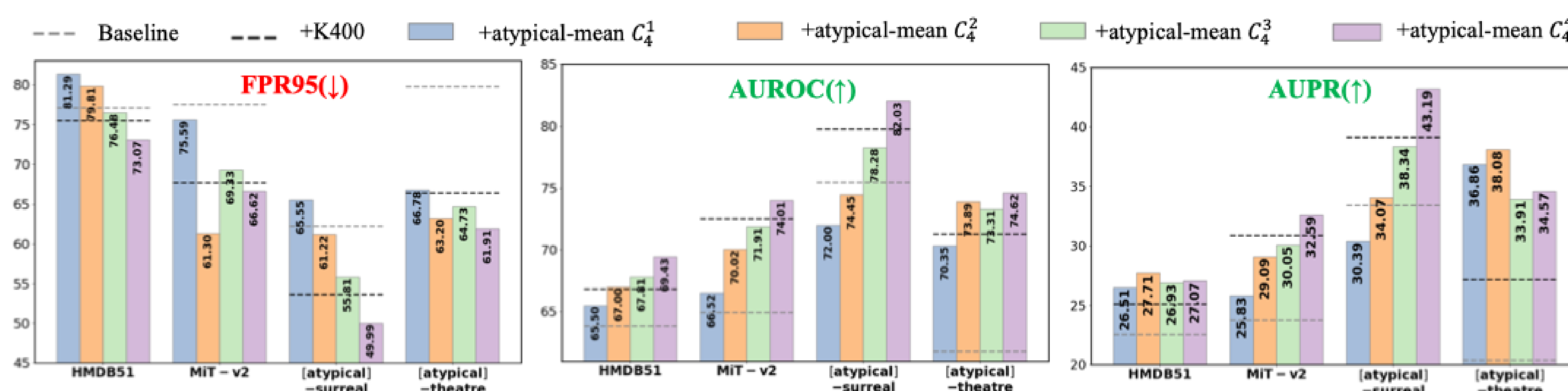
Metric	Baseline	+HMDB51	+K400	+atypical	+HMDB51+K400	+HMDB51+atypical
Top-1 ↑	57.40	57.02	58.23	58.30	61.31	62.96
Top-5 ↑	94.97	96.62	96.84	97.45	96.62	96.39

What can we learn from Harry Potter?

Atypical dataset exhibits semantic and distributional diversity



Semantic diversity helps open-world learning



Atypical data coverage helps open-world learning

Test Sets	Metric	+abn_sci	+abn_uni	+abn_ani	+ani_sci	+ani_uni	+sci_uni	Mean ± Std Dev
HMDB51 [25]	FPR95 ↓	81.86	78.36	80.72	82.06	79.06	76.77	79.81 ± 2.10
	AUROC ↑	65.50	65.77	66.63	66.03	68.09	69.97	67.00 ± 1.72
	AUPR ↑	29.38	23.39	28.40	30.49	25.93	28.67	27.71 ± 2.60
MiT-v2 [32]	FPR95 ↓	79.98	68.26	78.49	79.70	61.40	64.83	72.11 ± 8.27
	AUROC ↑	63.89	73.46	67.23	65.35	75.30	74.87	70.02 ± 5.11
	AUPR ↑	24.36	31.82	26.91	25.36	32.94	33.16	29.09 ± 4.00
[atypical]-surreal	FPR95 ↓	75.99	48.32	73.31	74.11	47.32	48.29	61.22 ± 14.54
	AUROC ↑	64.54	83.28	67.74	65.95	82.94	82.22	74.45 ± 9.23
	AUPR ↑	22.26	44.81	25.18	23.31	44.69	44.14	34.07 ± 11.52
[atypical]-theatre	FPR95 ↓	75.96	81.27	57.40	41.13	58.72	64.70	63.20 ± 14.37
	AUROC ↑	69.89	56.26	82.45	91.18	73.34	70.19	73.89 ± 11.94
	AUPR ↑	31.75	16.73	52.84	73.82	28.64	26.72	38.42 ± 21.02