# Why Can't I Dance in the Mall? Learning to Mitigate Scene Bias in Action Recognition



# Jinwoo Choi

## Introduction



• Training a model on a scene biased dataset may lead to a biased model → Collecting more data does not scale

**Q**: How do we learn to mitigate scene biases in action recognition from biased datasets? "Debiasing": mitigating unwanted biases

# **Experimental Results**

#### **Action Classification**

Method	Backbone	Top-1 accuracies on		
		UCF-101	HMDB-51	Diving4
Baseline	3D-ResNet-18	83.5 (+0)	53.6 (+0)	18.0 (+
Debiased (ours)	3D-ResNet-18	84.5 <b>(+1.0)</b>	56.7 <b>(+3.1)</b>	20.5 <b>(+</b> )
C3D	C3D	82.3		_
Factor-C3D	C3D	84.5	_	_
RESOUND-C3D	C3D	_	_	16.4
TSN	<b>BN-Inception</b>	85.1	51.0	16.8

#### **Temporal Action Localization**

Method Ir	Innuto	Backbone —	mean AP @ IOU threshold							
	inputs		0.1	0.2	0.3	0.4	0.5	0.6	0.7	avg.
Baseline	RGB	3D-ResNet-18	48.6	48.6	45.6	40.8	32.5	25.5	15.5	36.7 (+0)
Debiased (ours)	RGB	3D-ResNet-18	50.2	50.5	47.9	42.3	33.4	26.3	16.8	38.2 <b>(+1.5)</b>
CDC	RGB	C3D	_	_	40.1	29.4	23.3	13.1	7.9	-
TAL-Net	<b>RGB+Flow</b>	I3D	59.8	57.1	53.2	48.5	42.8	33.8	20.8	45.1
SSN	RGB+Flow	InceptionV3	66.0	59.4	51.9	41.0	29.8	19.6	10.7	39.8

# Chen Gao Joseph C. E. Mesou Jia-Bin Huang Virginia Tech







Debiased (ours

ACT

S3D-G





### **Ablation Studies**

LAdv	In	Top-1 accuracies on HMDB-51					
	LEnt	Split-1	Split-2	Split-3	avg.		
X	X	52.9	55.4	52.6	53.6 (+0)		
X	$\checkmark$	55.0	55.3	55.1	55.1 <b>(+1.5)</b>		
$\checkmark$	X	56.4	55.9	56.4	56.2 <b>(+2.6)</b>		
		56.4	57.3	56.5	56.7 (+3.1)		
		Top-1 accuracies on HMDB-51					
seudo label		Split-1	Split-2	Split-3	avg.		
one (w/o det	biasing)	52.9	55.4	52.6	53.6 (+0)		
ard		54.8	54.2	54.6	54.5 <b>(+0.9)</b>		
oft (ours)		56.4	57.3	56.4	56.2 (+2.6)		

#### **Spatio-Temporal Action Detection**

Inputs	Backbone	Pre-train on	mean AP
RGB	VGG	ImageNet+MiniKinetics	32.5 (+0)
RGB	VGG	ImageNet+MiniKinetics	34.5 <b>(+2.0)</b>
RGB+Flow	VGG	ImageNet	65.7
RGB+Flow	Inception (2+1)D	ImageNet+FullKinetics	75.2





# Code available at: https://bit.ly/34ULoly



## Visualization