

SIMCO: SIMilarity-based object Counting Marco Godi*, Christian Joppi*, Andrea Giachetti, Marco Cristani University of Verona



INTRODUCTION

We present SIMCO, the first agnostic multi-class object counting approach. SIMCO starts by detecting foreground objects through a novel MaskRCNN-based architecture trained beforehand on a brand-new synthetic 2D shape dataset, InShape; the idea is to highlight every object resembling a primitive 2D shape. Each object detected is described by a low-dimensional embedding, obtained from a novel similarity-based this Subsequently, SIMCO branch. head uses embedding for clustering, so that different types of objects can emerge and be counted.



Agnostic Counting Results on Reptile [2] Method Counting Running Time (s) MAE NMAE Cai and Baciu [3] 59 1,034 2814 Arteta et al. [4] 1,629 685 50 Setti et al. TM 18 0,186 Setti et al. TM + CE 18 0,164 Setti et al. complete [2] 0,109 867 14

COCO/Mask-RCNN/FC 46 0,521 0,18 InShape/Mask-RCNN/FC 19 0,272 0,18 SIMCO 8,66 0,086 0,18

Agnostic Counting Results on Cells [6]

Method	Counting		Running Time (s)
	MAE	NMAE	
Cai and Baciu [3]	149	0,809	753
SharpMask [7]	42	0,21	8,76
COCO/Mask-RCNN	175,65	0,99	0,12
SIMCO	12	0,07	0,11



METHOD



• **SIMCO detection:** generate boxes to locate objects through a novel Mask-RCNN-based architecture [1] trained on *InShape*

Train on:

Test on:



• SIMCO clustering: cluster objects by a lowdimensional embedding obtained from the new similarity-based head branch





REFERENCES



Affinity propagation preference

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