

Gradient-Induced Co-Saliency Detection

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What is **co**-saliency detection (Co-SOD) ?

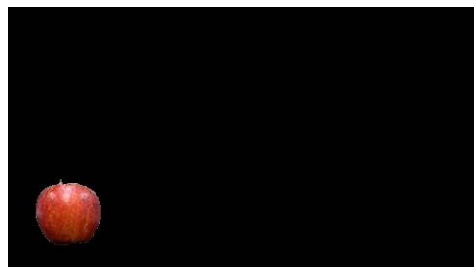
Input Images



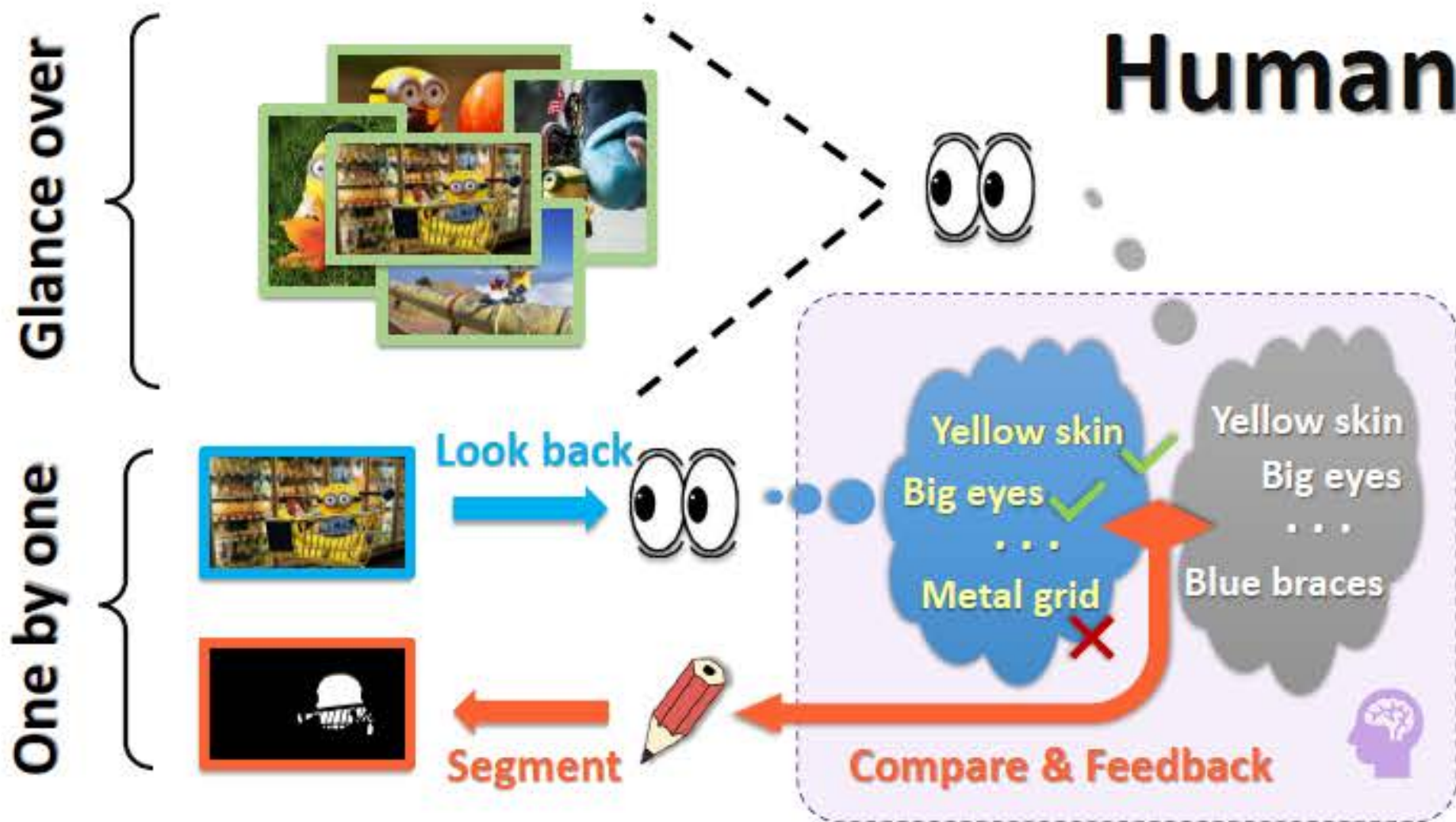
Salient Object
Detection



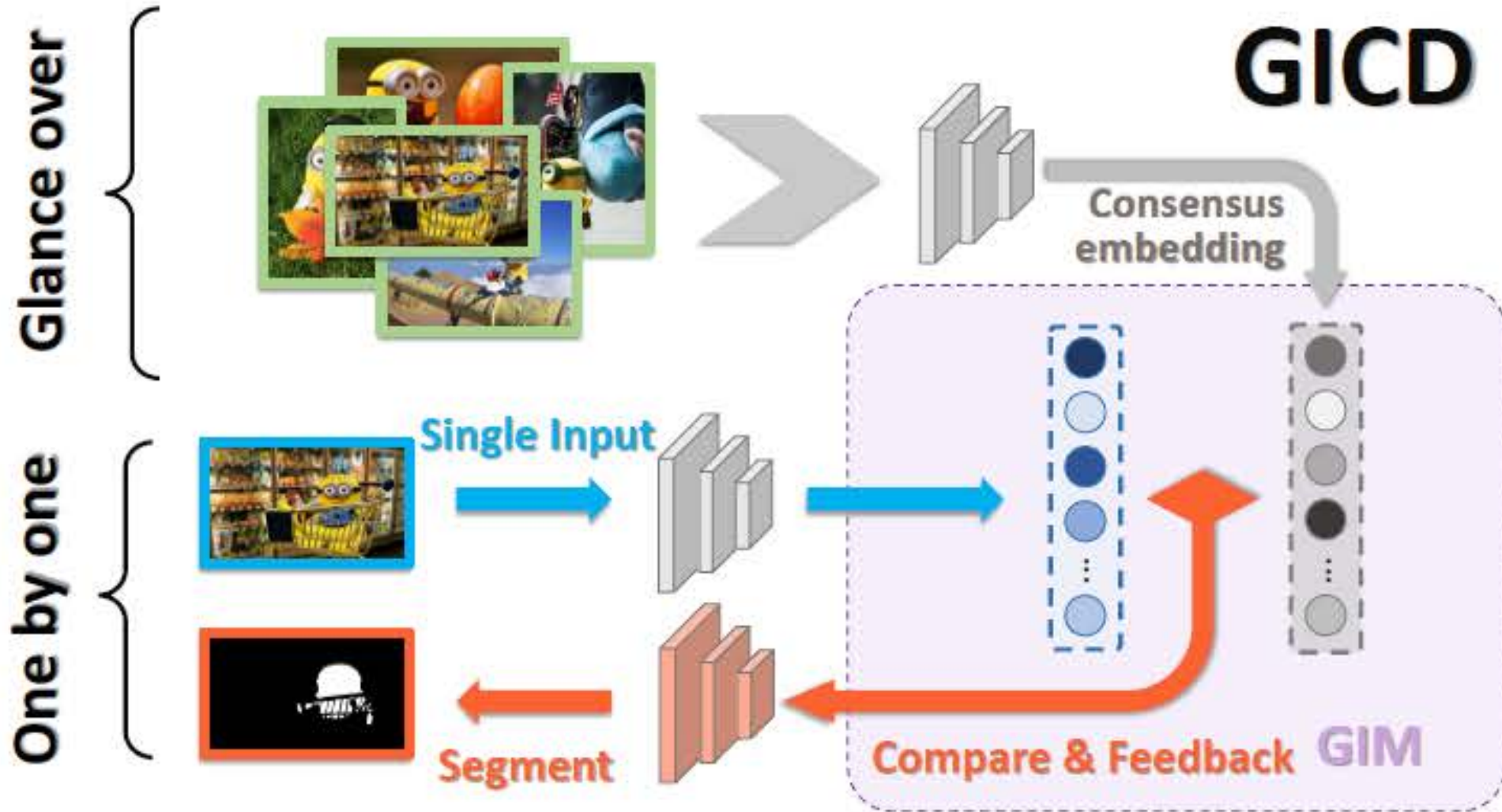
 Co-Saliency
Detection



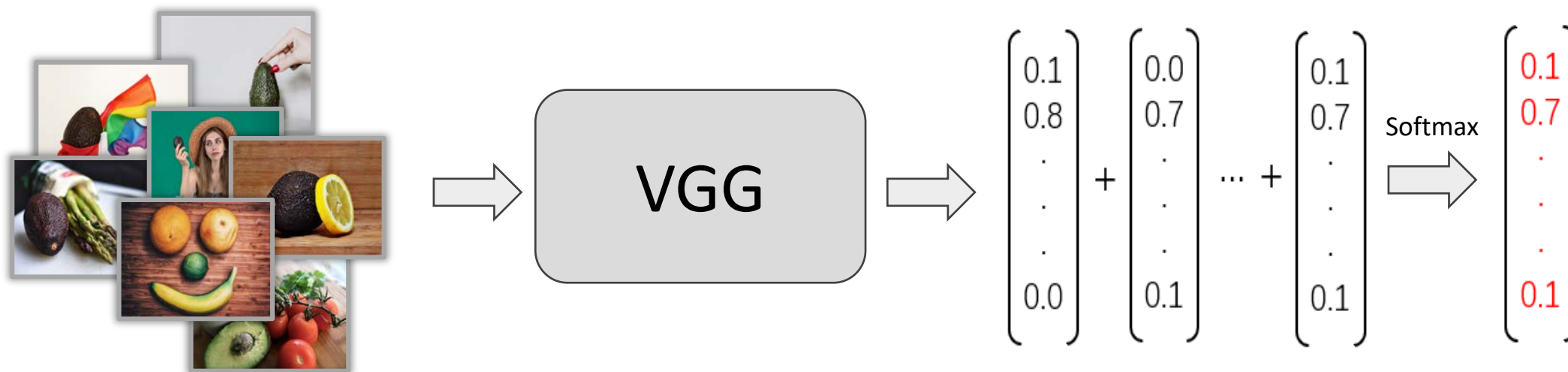
How do humans do it?



Gradient-Induced Co-Saliency Detection



How to get consensus representation?



Gradient Inducing Module (GIM)

Input



Convolutional kernels

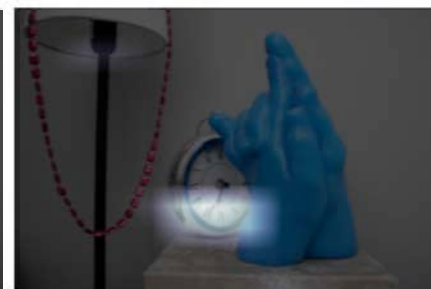
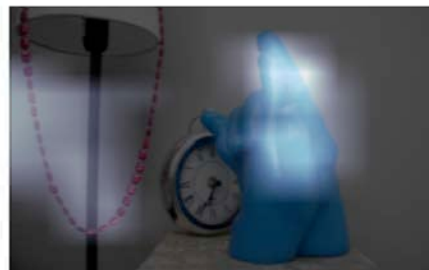


Gradient Inducing Module (GIM)

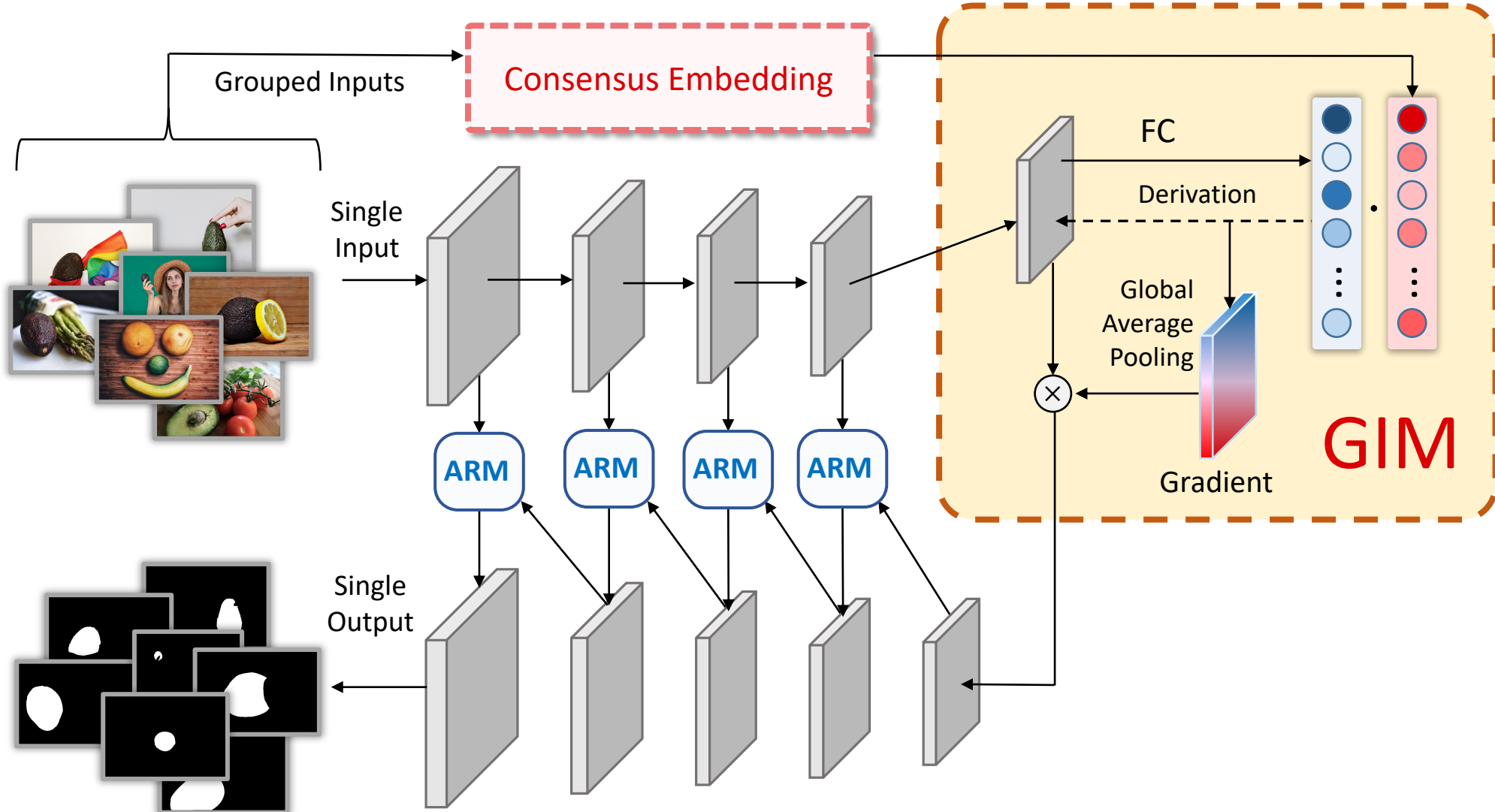
Input



Convolutional kernels

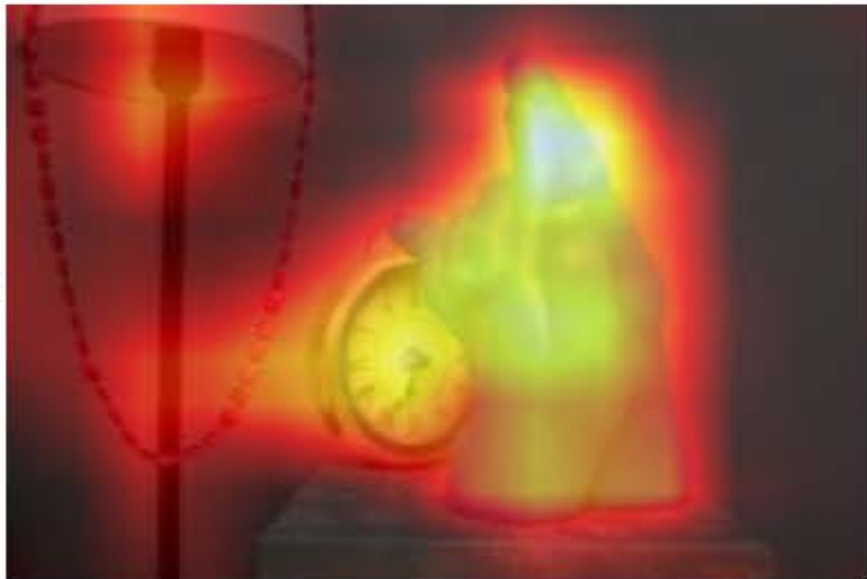


Gradient Inducing Module (GIM)

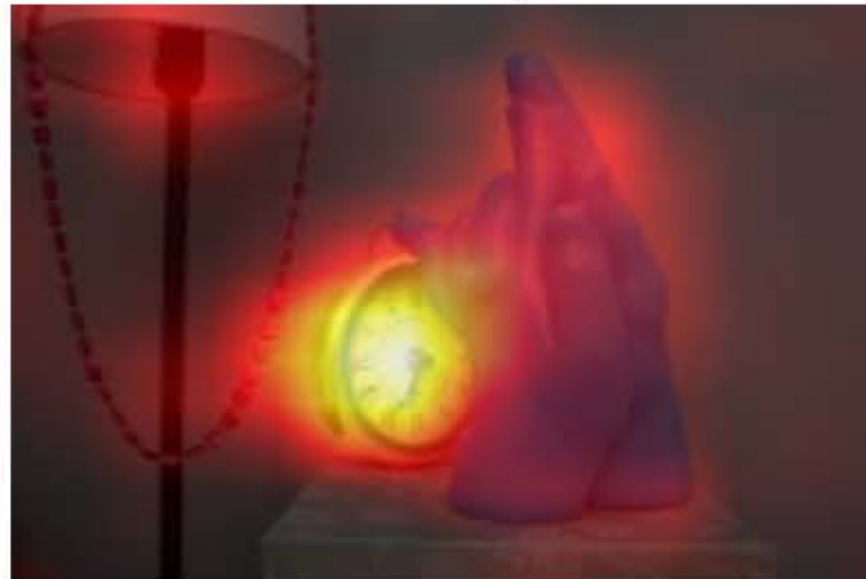


Gradient Inducing Module (GIM)

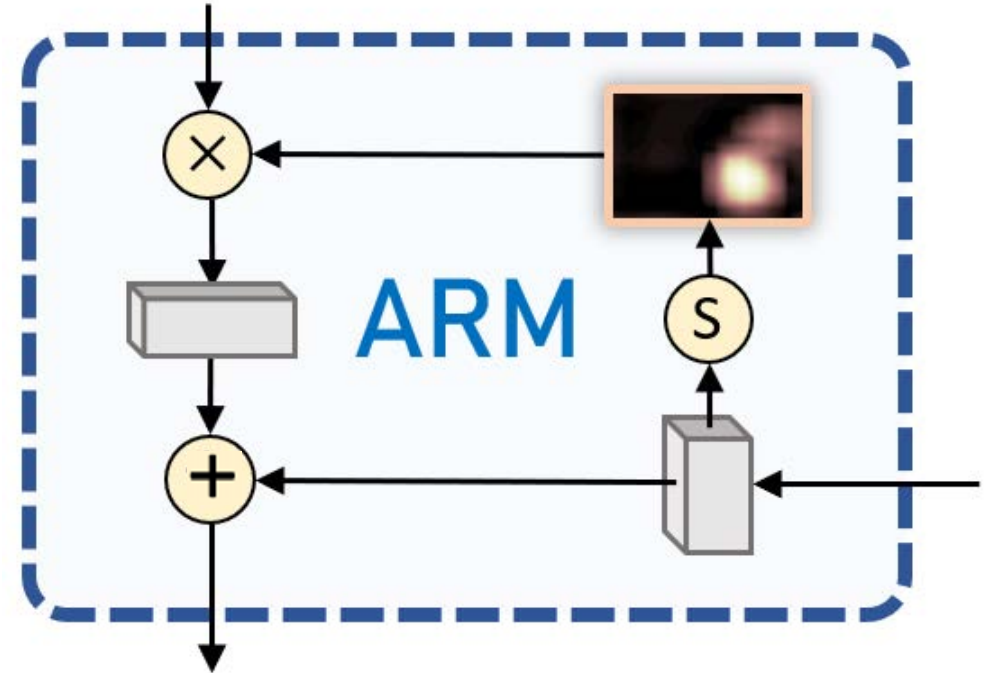
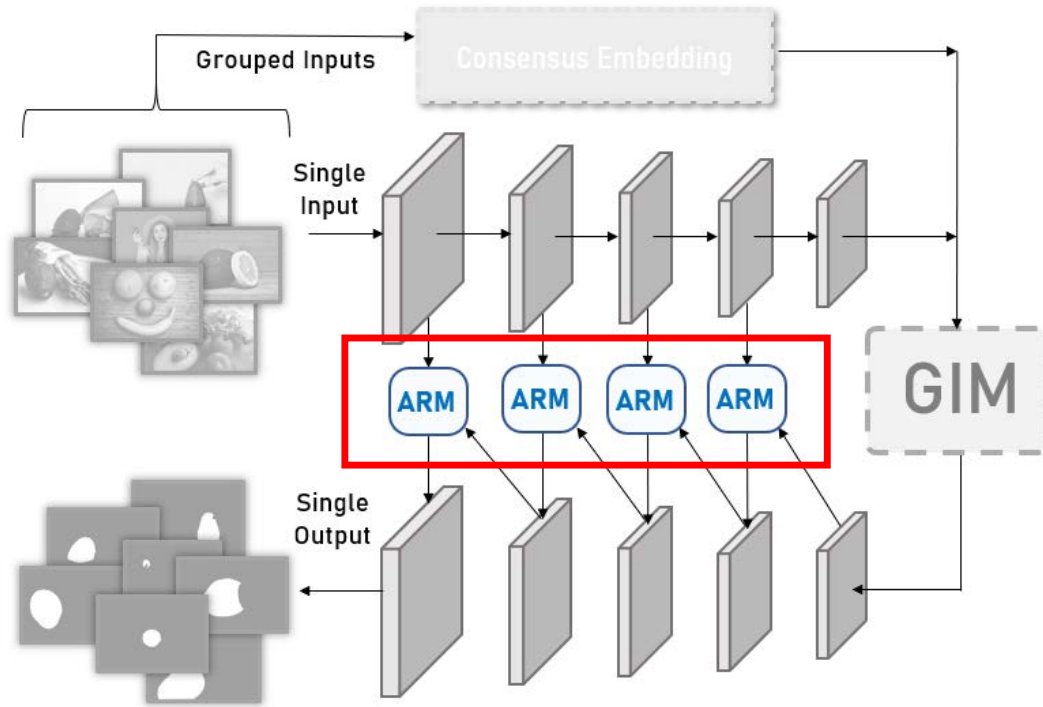
Mean



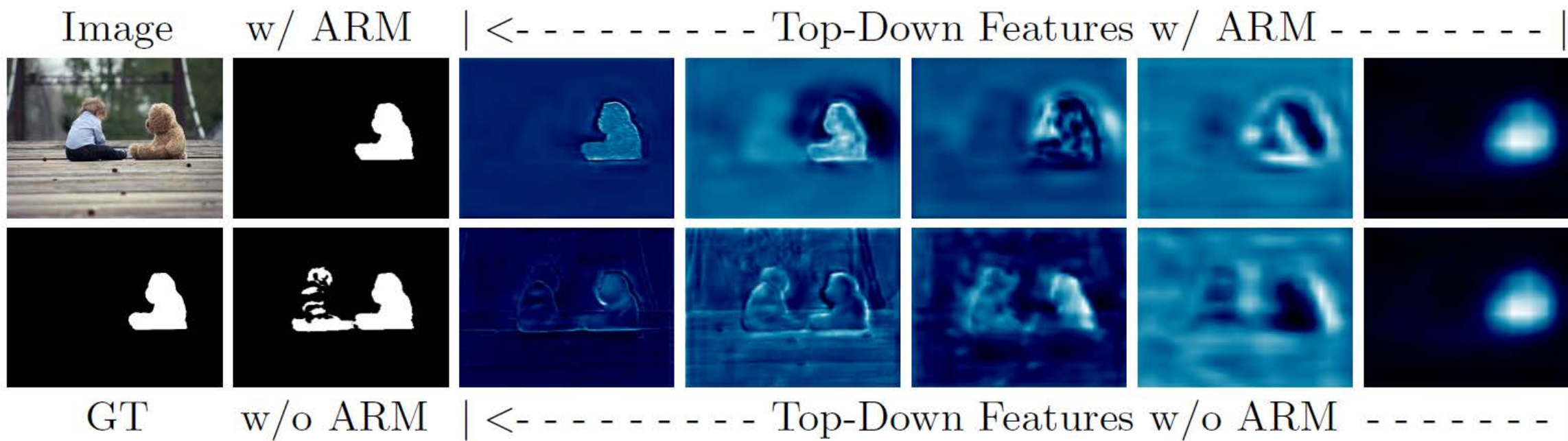
Mean w/ GIM



Attention Retaining Module (ARM)



Attention Retaining Module (ARM)

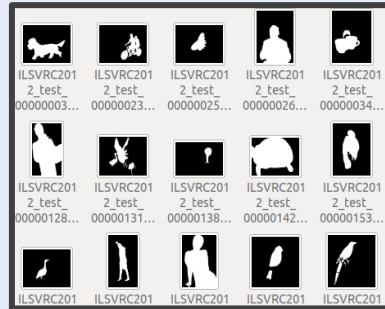


How to get training data ?



DUTS

SOD Dataset



1. Category-Agnostic ❌



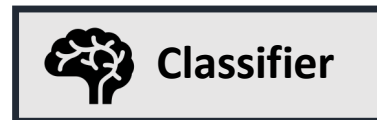
2. Single Object ❌

Jigsaw Training (JT) strategy

Convert any SOD dataset to Co-SOD dataset



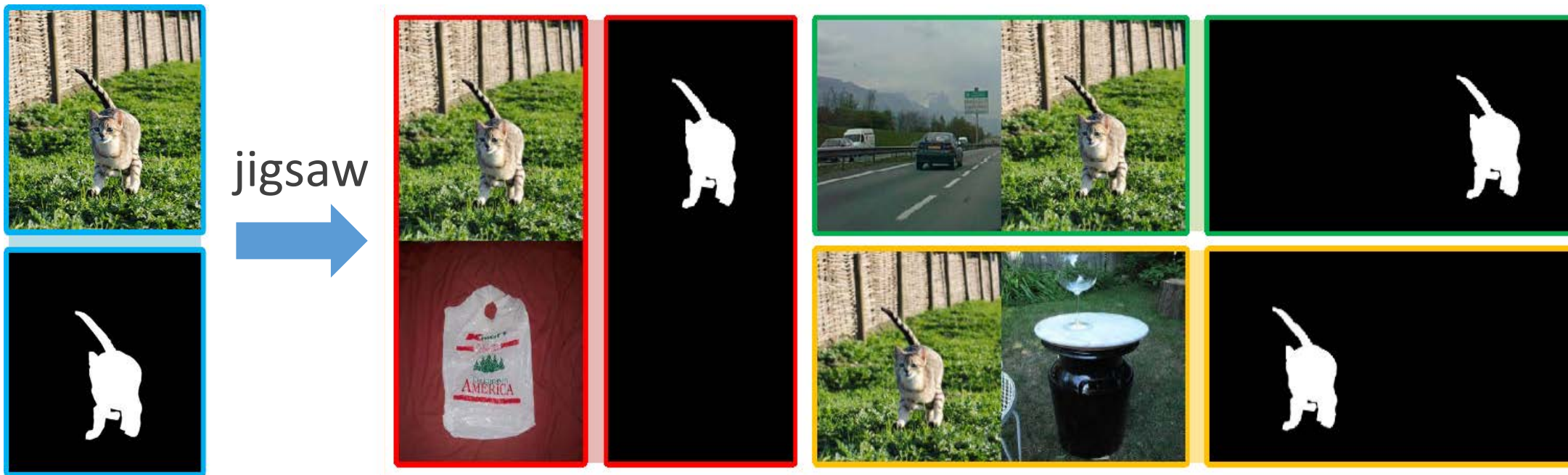
*



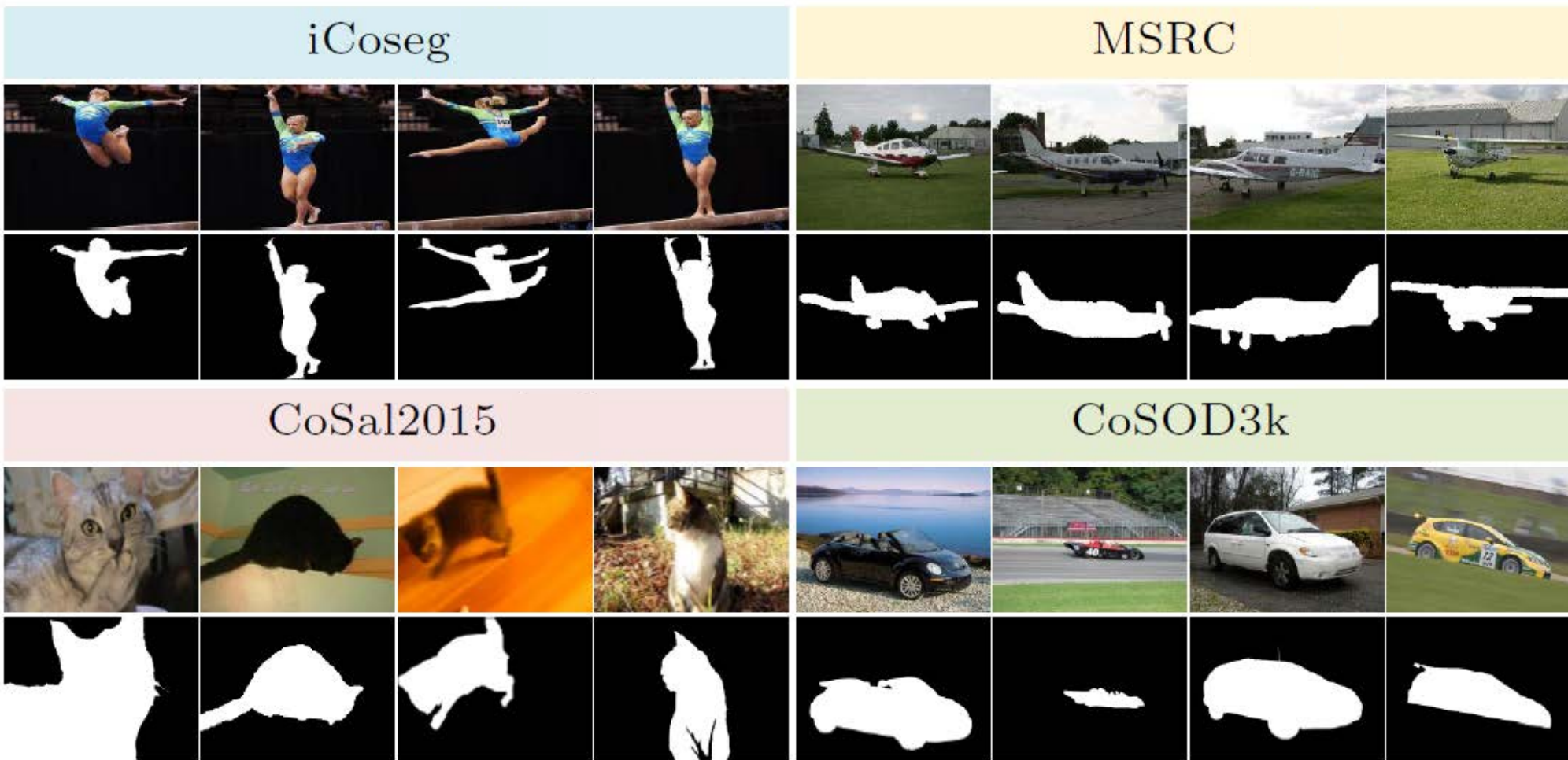
Category

Jigsaw Training (JT) strategy

Step-2



Current Evaluation Datasets

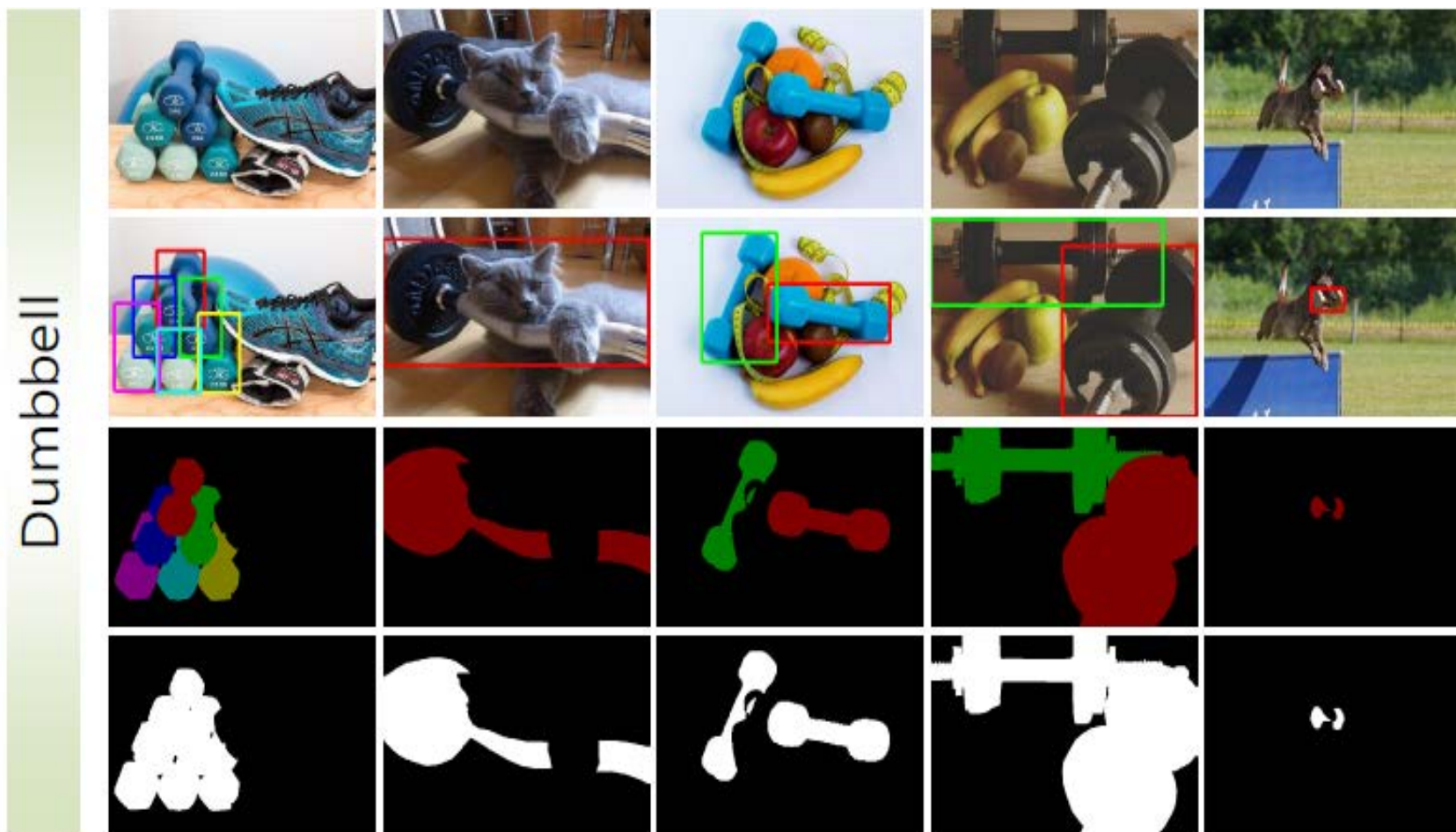


Proposed CoCA Dataset

Common Category Aggregation (CoCA) dataset



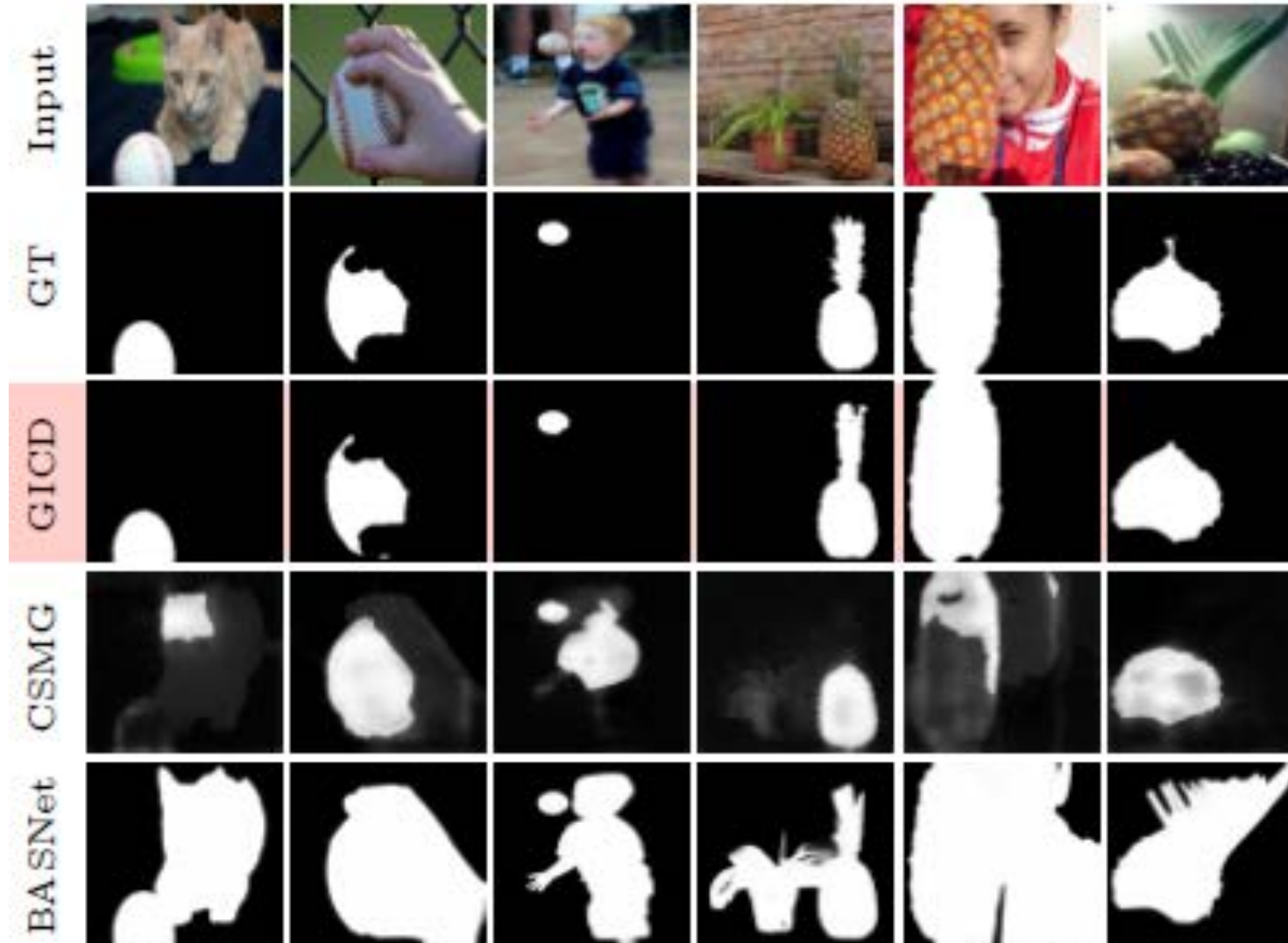
Proposed CoCA Dataset



Comparison with State-of-the-Arts

		CBCD	GW	CSMG	RCAN	BASNet	PoolNet	SCRN	GICD
CoSaI2015	$F_{\text{avg}} \uparrow$	0.378	0.639	0.721	0.670	0.778	0.768	0.755	0.835
	$F_{\text{max}} \uparrow$	0.547	0.706	0.787	0.764	0.791	0.785	0.783	0.844
	$S_{\alpha} \uparrow$	0.550	0.744	0.776	0.779	0.822	0.823	0.817	0.844
	$E_{\xi} \uparrow$	0.516	0.727	0.763	0.742	0.841	0.836	0.822	0.883
CoCA	$F_{\text{avg}} \uparrow$	0.230	0.358	0.390	0.360	0.398	0.394	0.394	0.504
	$F_{\text{max}} \uparrow$	0.313	0.408	0.499	0.422	0.408	0.404	0.413	0.513
	$S_{\alpha} \uparrow$	0.523	0.602	0.627	0.616	0.592	0.602	0.612	0.658
	$E_{\xi} \uparrow$	0.535	0.615	0.606	0.614	0.600	0.616	0.625	0.701

Comparison with State-of-the-Arts

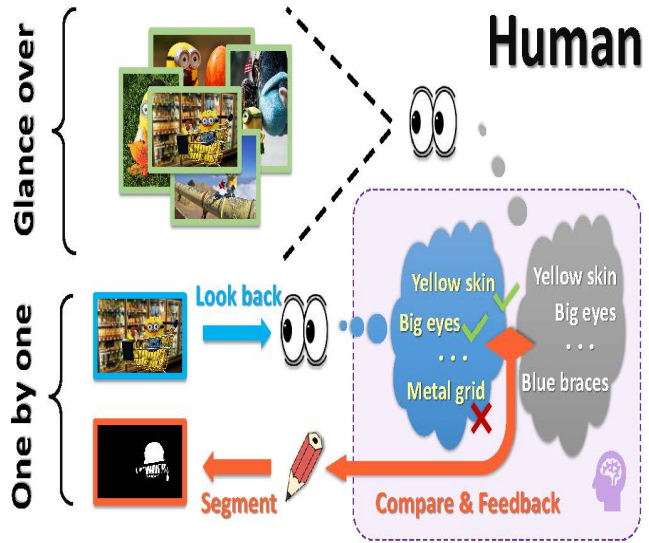


Ablation Study

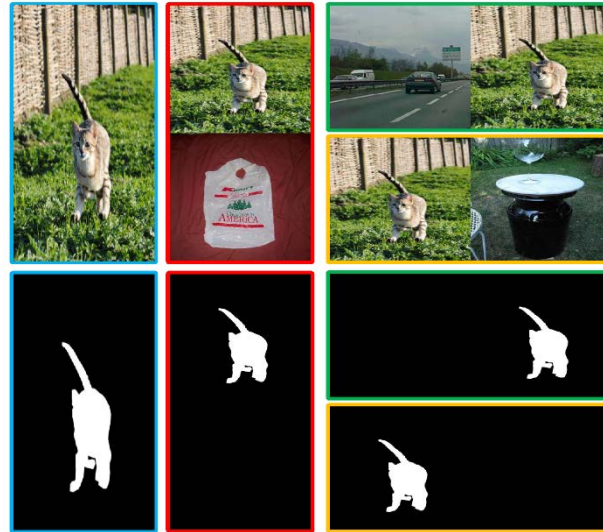
Variant	Candidate			CoCA				CoSal2015			
	JT	GIM	ARM	$F_{avg} \uparrow$	$F_{max} \uparrow$	$S_\alpha \uparrow$	$E_\xi \uparrow$	$F_{avg} \uparrow$	$F_{max} \uparrow$	$S_\alpha \uparrow$	$E_\xi \uparrow$
A				0.420	0.430	0.601	0.627	0.788	0.800	0.818	0.852
B	✓			0.424	0.430	0.602	0.655	0.750	0.759	0.782	0.821
C		✓		0.446	0.462	0.618	0.643	0.809	0.824	0.833	0.868
D			✓	0.429	0.437	0.607	0.628	0.800	0.809	0.829	0.860
E	✓	✓		0.470	0.478	0.631	0.689	0.795	0.803	0.808	0.850
F	✓		✓	0.436	0.442	0.612	0.654	0.762	0.770	0.795	0.832
G		✓	✓	0.471	0.480	0.636	0.667	0.826	0.835	0.845	0.879
GICD	✓	✓	✓	0.504	0.513	0.658	0.701	0.835	0.844	0.844	0.883

Our Contributions

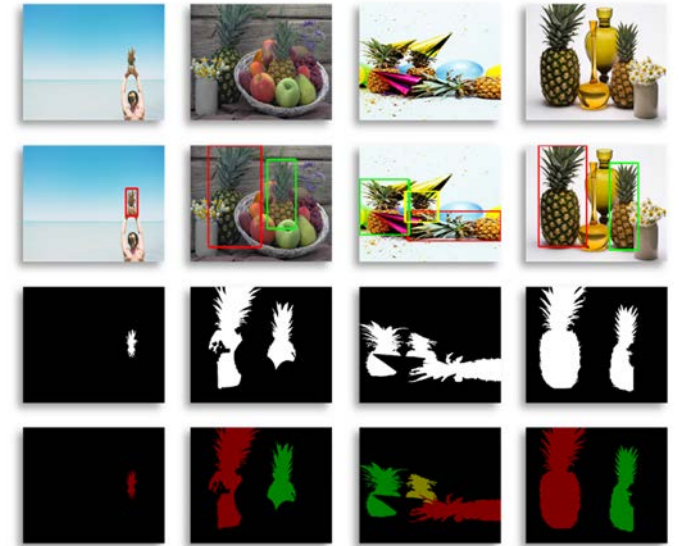
Human-inspired Co-SOD model



Jigsaw training strategy



New challenging dataset



Thank you!

Welcome to use our **CoCA** dataset for evaluation.

Codes and dataset can be obtained from the QR code 🙌



<https://mmcheng.net/gicd/>