Multi-Branch Attention Networks for Classifying Galaxy Clusters

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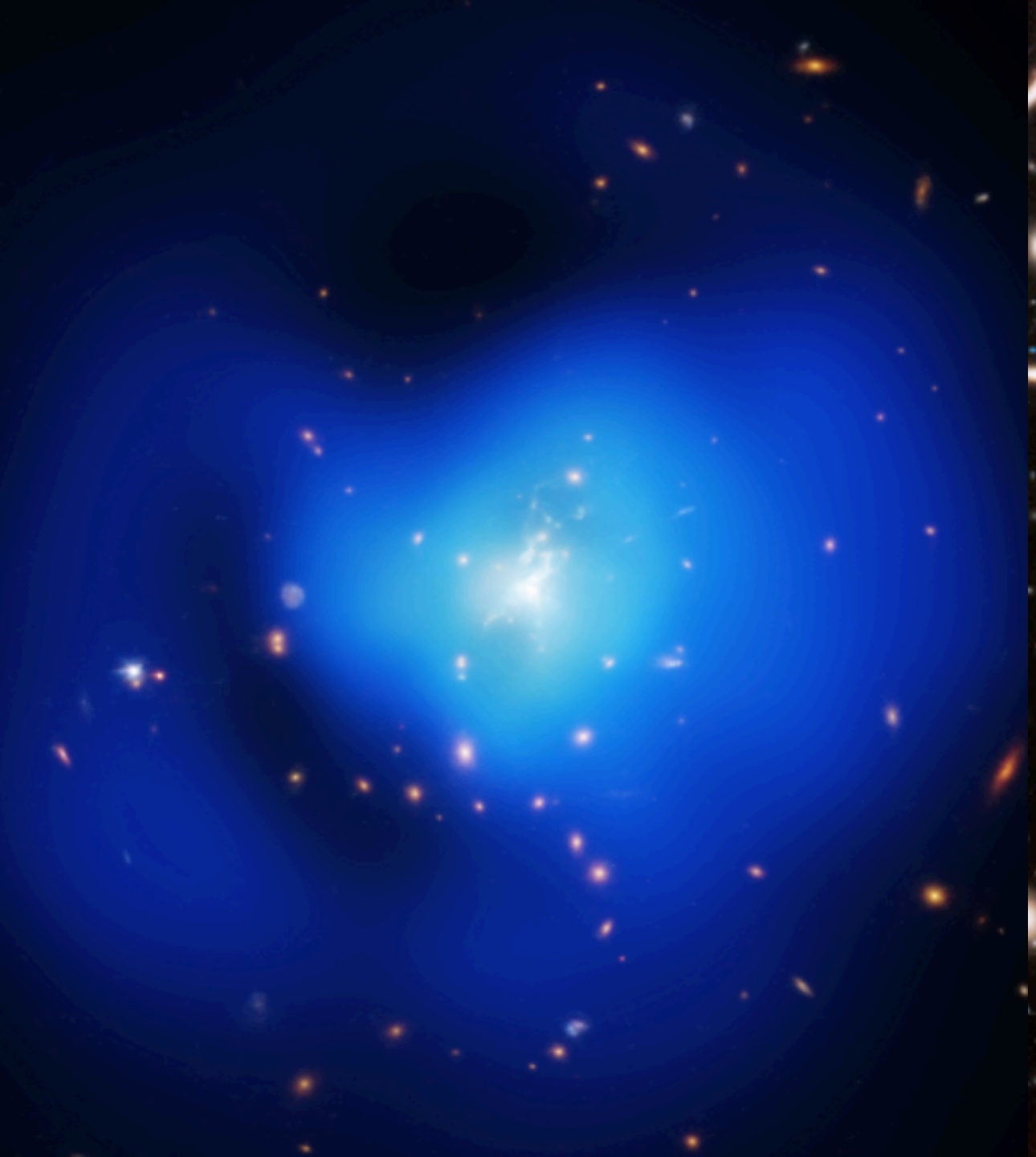
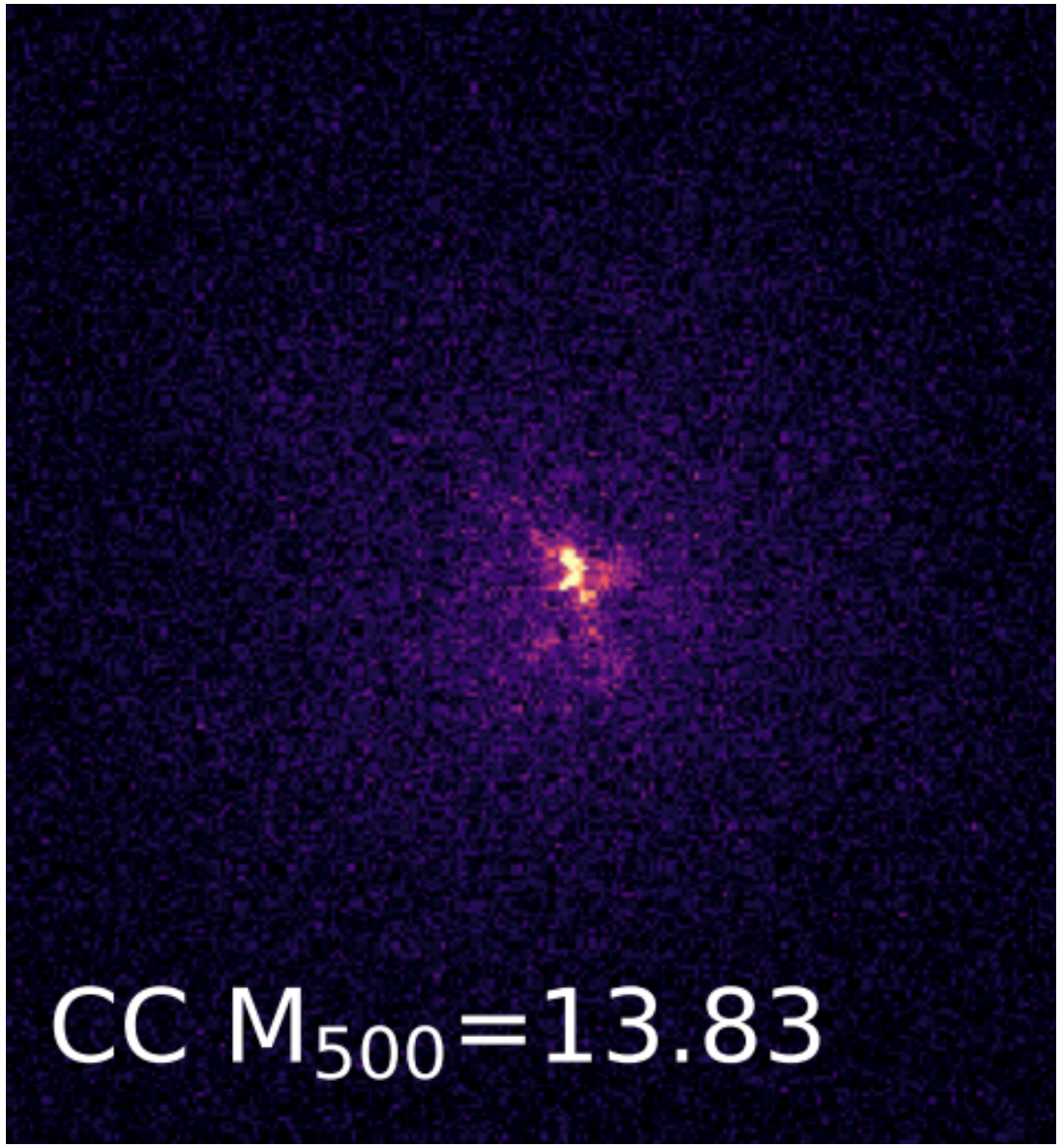
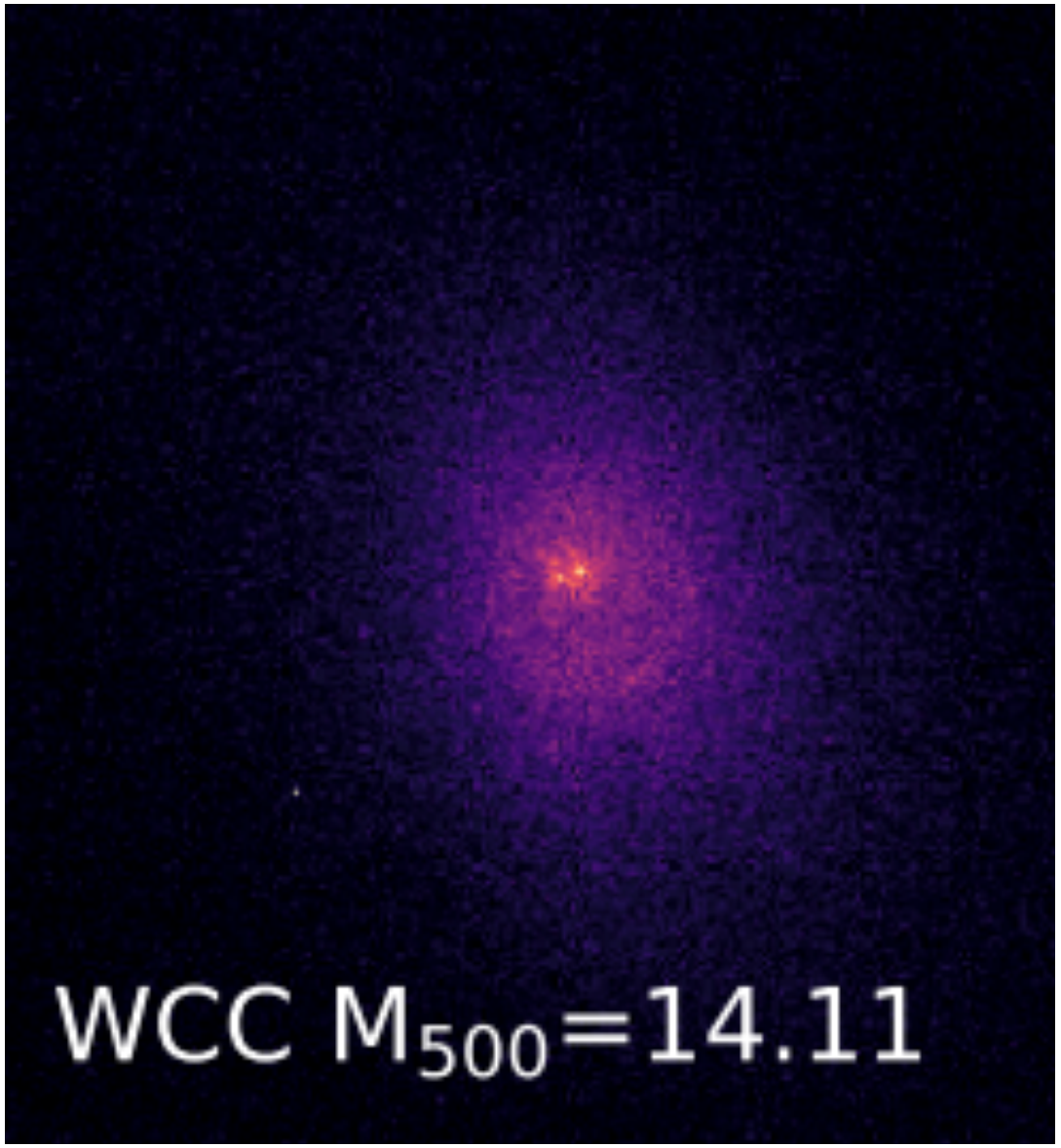
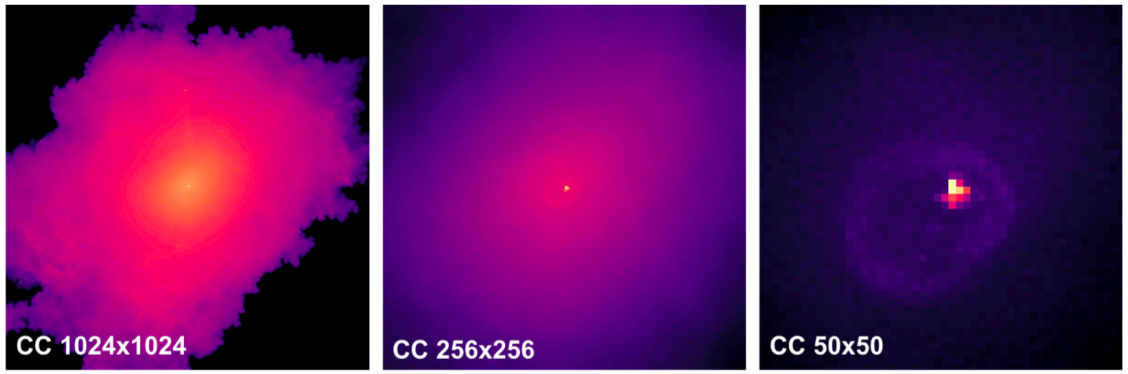


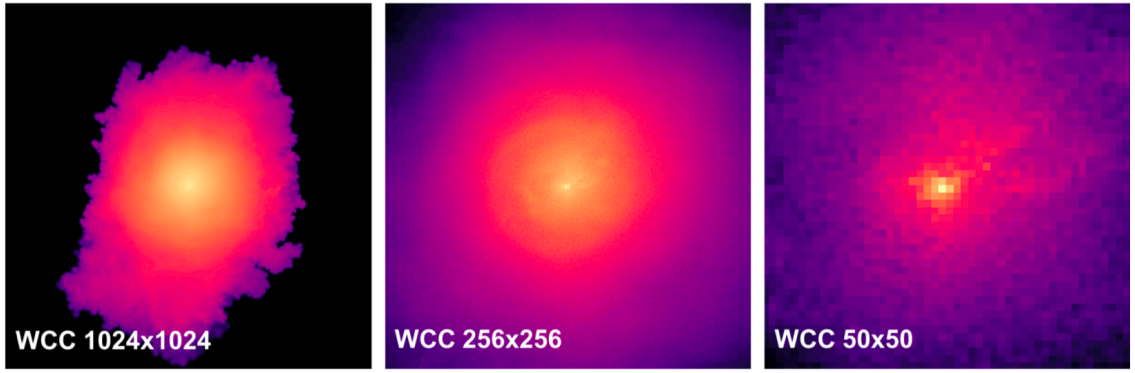

CC M_{500}=13.83


WCC M_{500}=14.11

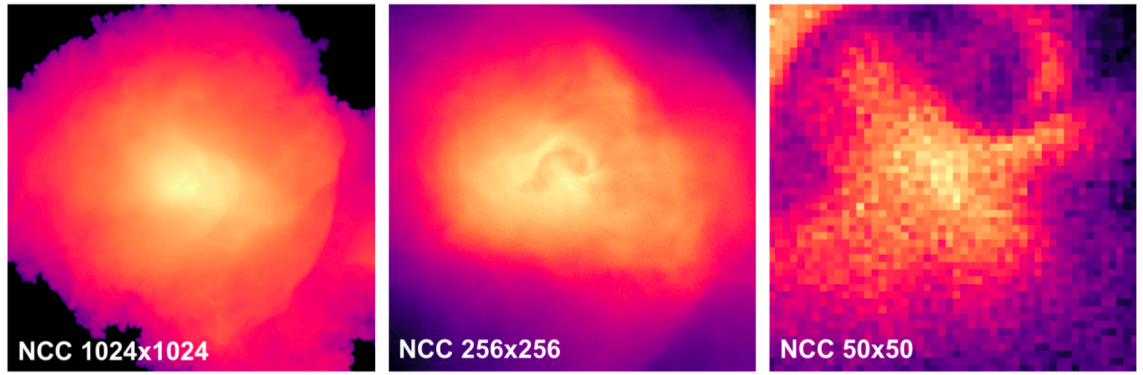
Cool-Core Clusters

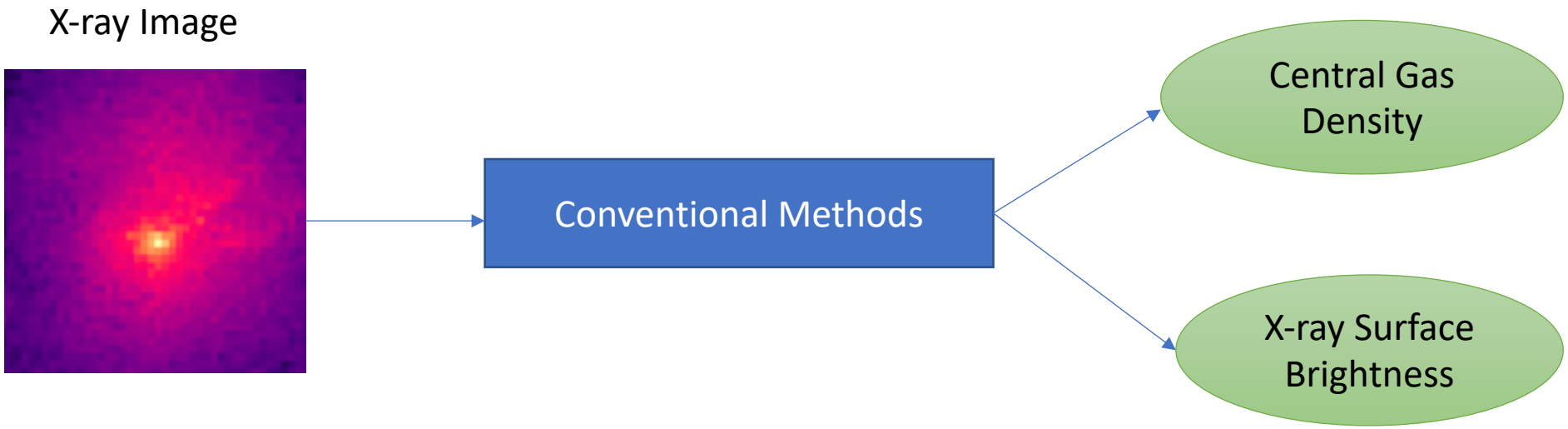


Weak-Cool-Core Clusters



None-Cool-Core Clusters

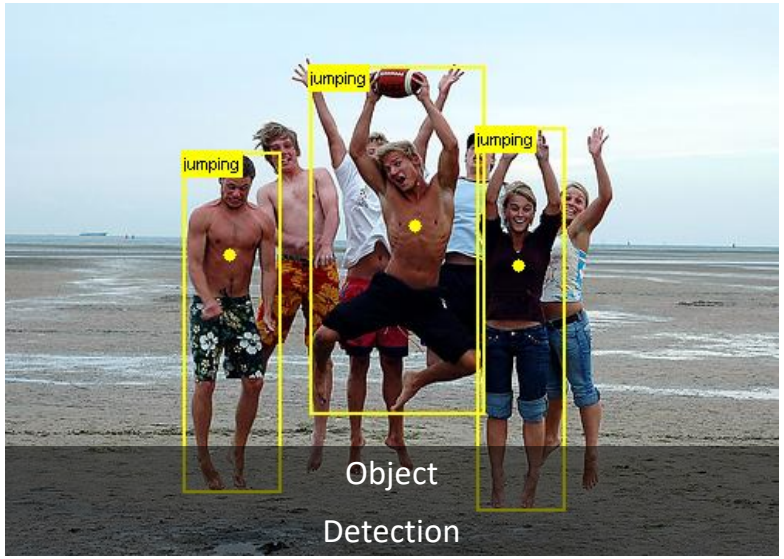




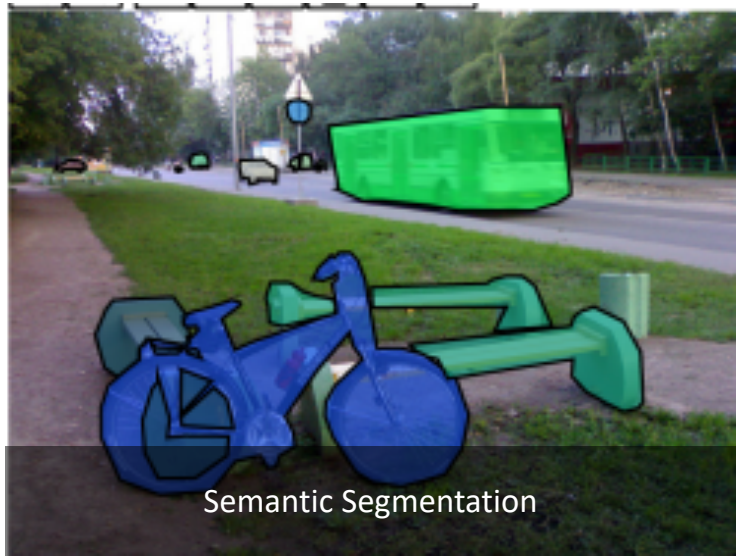
However, measuring those quantities is still a challenging task and leads to inaccurate predictions of core types.

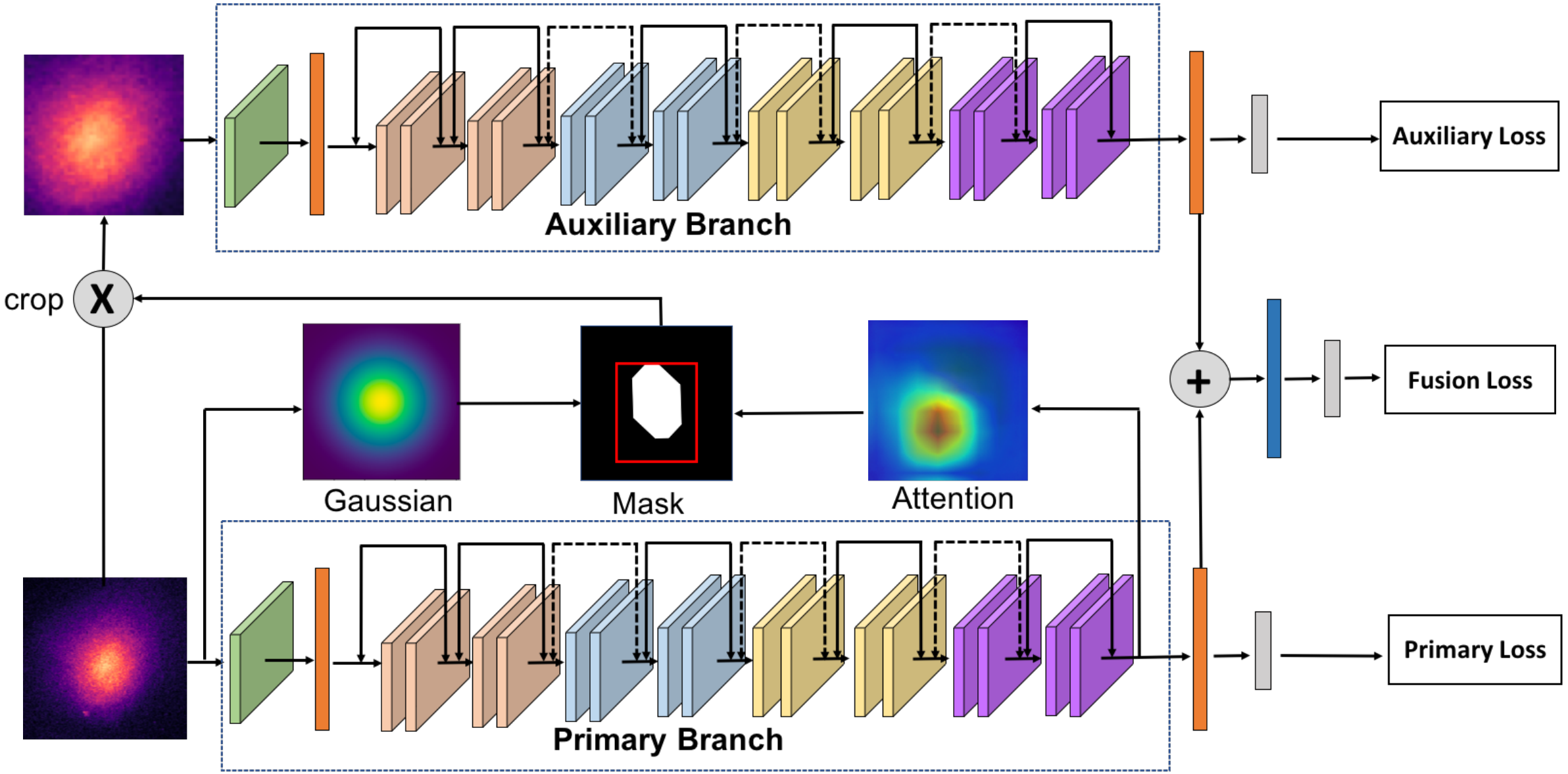
Deep Learning in Computer Vision


Image Recognition



Object Detection


Semantic Segmentation


Auxiliary Branch
Auxiliary Loss
crop
X
Gaussian
Mask
Attention
+
Fusion Loss
Primary Branch
Primary Loss

Loss Function

$$L = \alpha_p L_p + \alpha_a L_a + \alpha_f L_f + \alpha_r L_r$$

Primary Loss **Auxiliary Loss** **Fusion Loss** **Ordinal Classification**

Experimental Results

TABLE I: Evaluation results of our approaches trained on different settings vs. baseline.

Approach	Attention	Gaussian	Regression	macro-avg. f1	class	precision	recall	f1
Baseline	✗	✗	✗	0.803	CC	0.59	0.79	0.68
					WCC	0.92	0.85	0.88
					NCC	0.84	0.86	0.85
Ours(Att)	✓	✗	✗	0.823	CC	0.62	0.81	0.70
					WCC	0.93	0.86	0.89
					NCC	0.86	0.90	0.88
Ours(Gauss)	✗	✓	✗	0.813	CC	0.58	0.79	0.67
					WCC	0.93	0.85	0.89
					NCC	0.86	0.90	0.88
Ours(Att+Gauss)	✓	✓	✗	0.827	CC	0.67	0.79	0.73
					WCC	0.91	0.86	0.89
					NCC	0.84	0.88	0.86
Ours(all)	✓	✓	✓	**0.830**	CC	0.65	0.86	0.74
					WCC	0.94	0.85	0.89
					NCC	0.83	0.90	0.86

Thanks for listening!

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