Face++ 旷视

Find Tiny Instance Segmentation

for Autonomous Driving

Megvii (Face++) Team

I. WAD Competition

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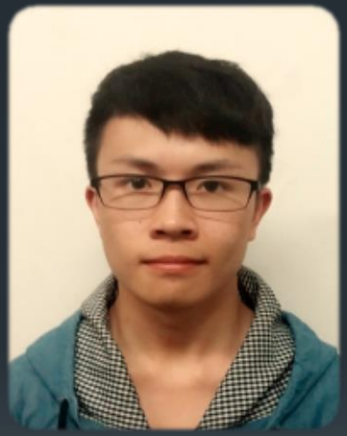
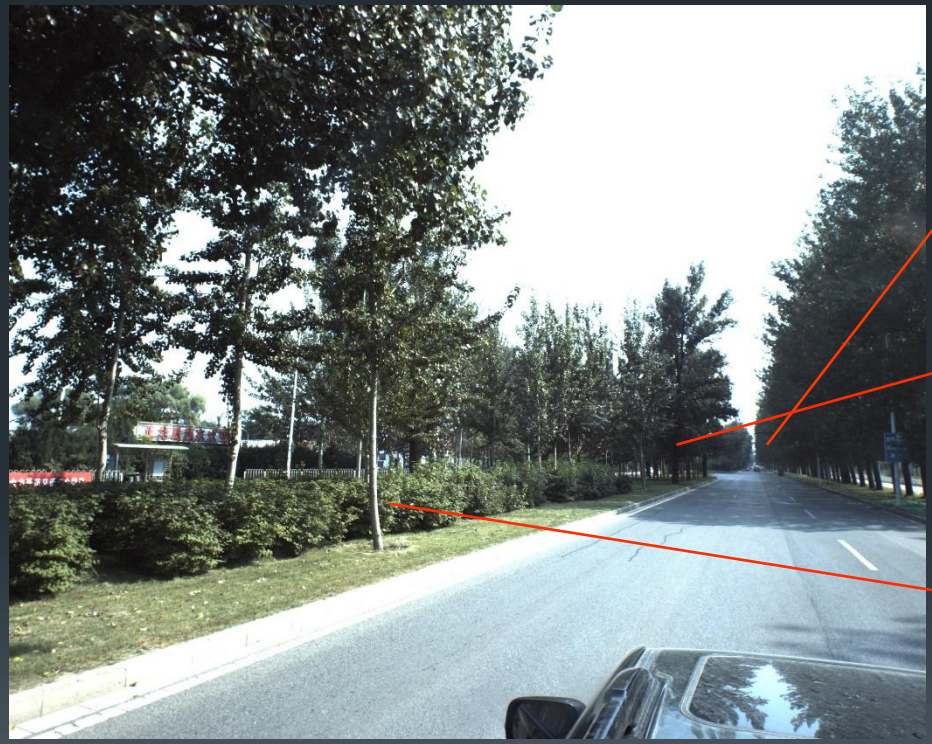
Peking University



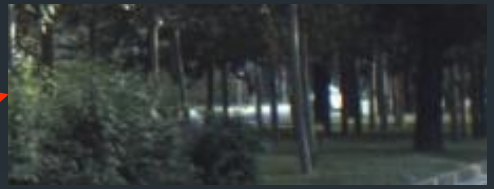
Zeming LI*
Tsinghua University

Gang YU
Megvii Inc

I. Challenge in WAD



Car !!!!!



Car !!!!!

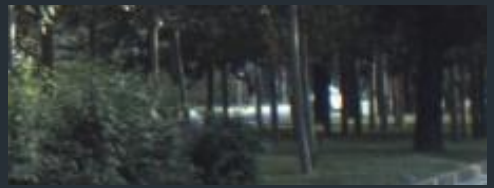
Bus !!!!!

9 Objects !!!!!

small objects dominants on this challenge

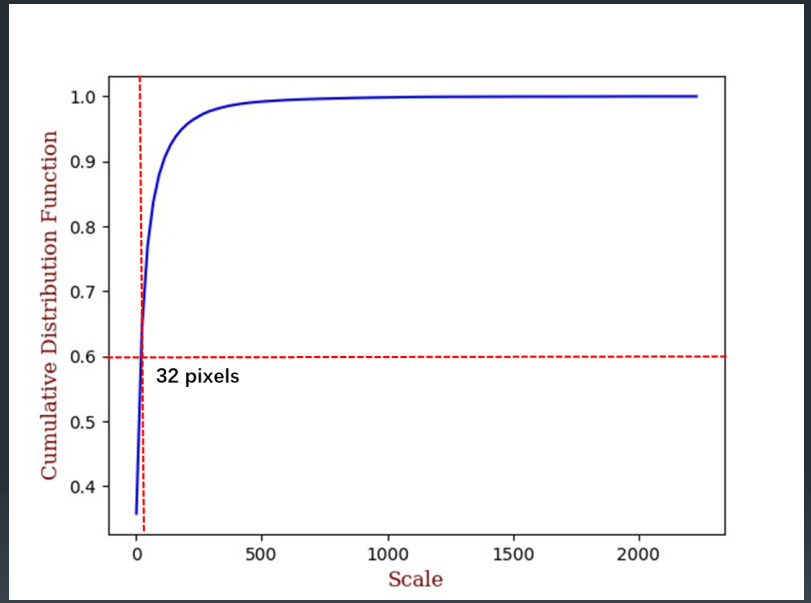
I. Challenge in WAD

Car !!!!!



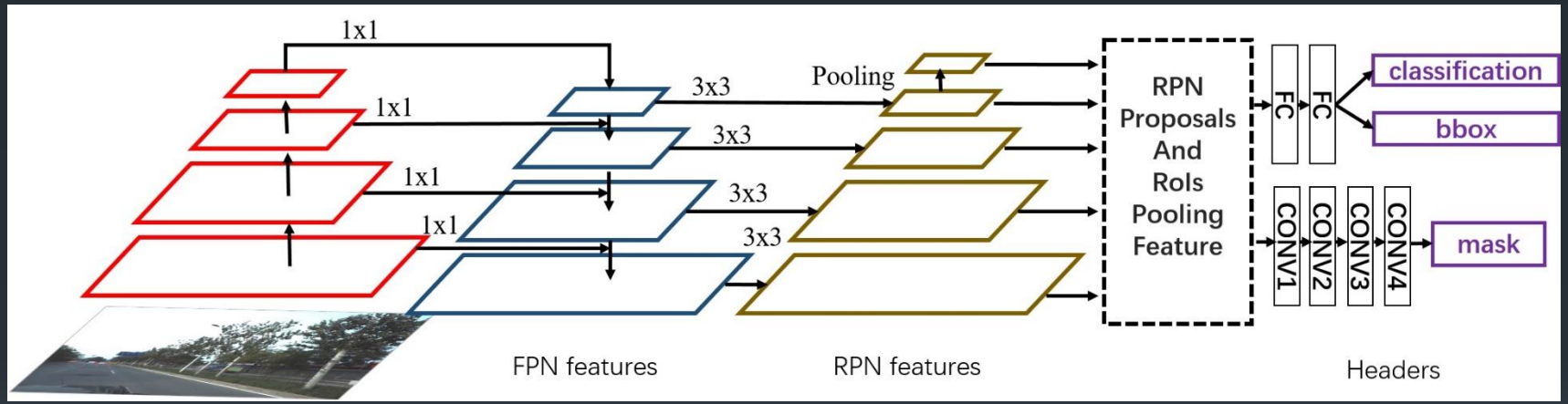
Car !!!!!

Bus !!!!!

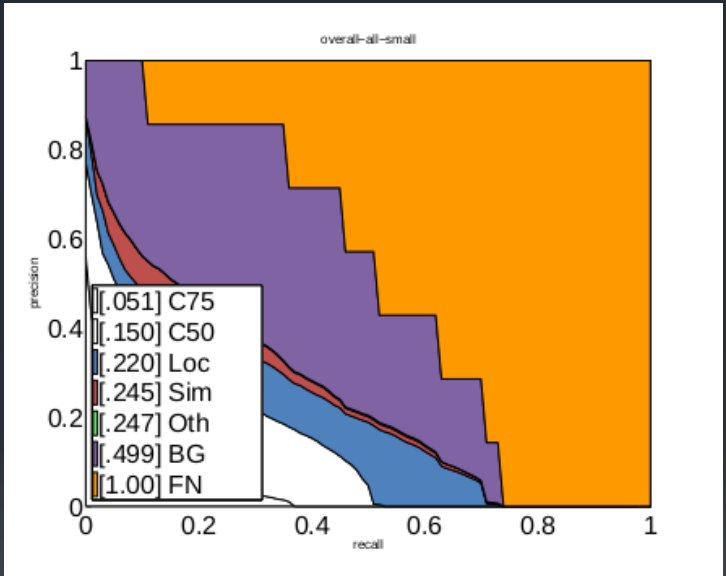


small objects dominants on this challenge

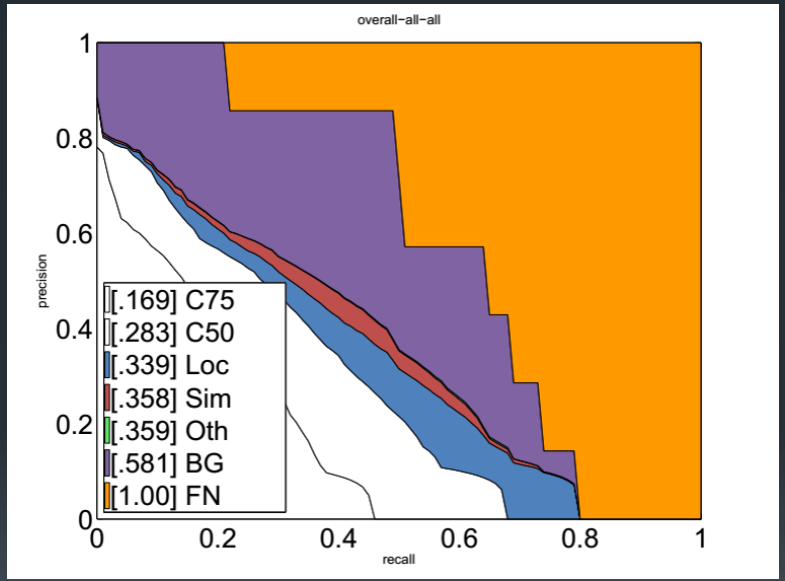
2. Our solution



Mask R-CNN Result

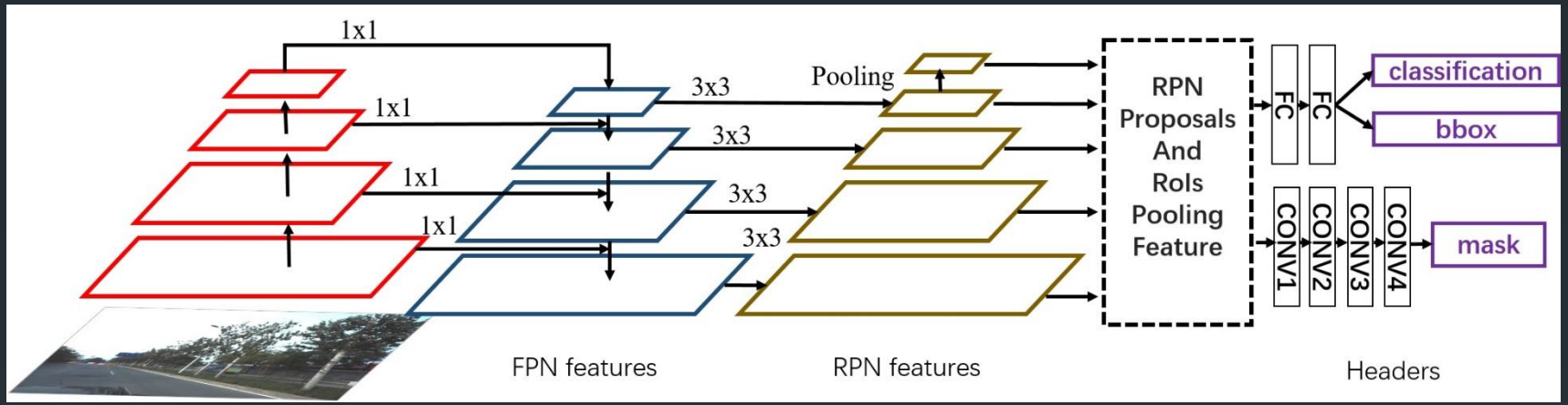


Small Objects Result



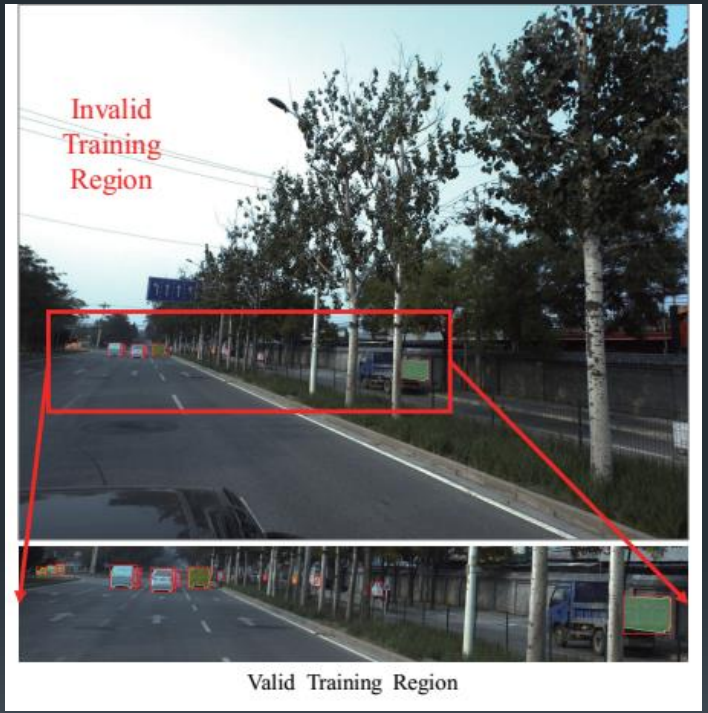
All Objects Result

2.1 Our solution



Network	mAP_{50}	mAP_{75}	mAP_s	mAP_m	mAP_l	mAP
Mask R-CNN	25.4	15.1	7.1	23.1	35.9	15.2
+ [COCO]	28.1	16.8	7.5	26.9	36.8	16.9
+ CA	28.6	17.0	7.4	28.0	40.0	17.2
+ PA	29.4	17.8	8.2	27.9	40.2	17.7

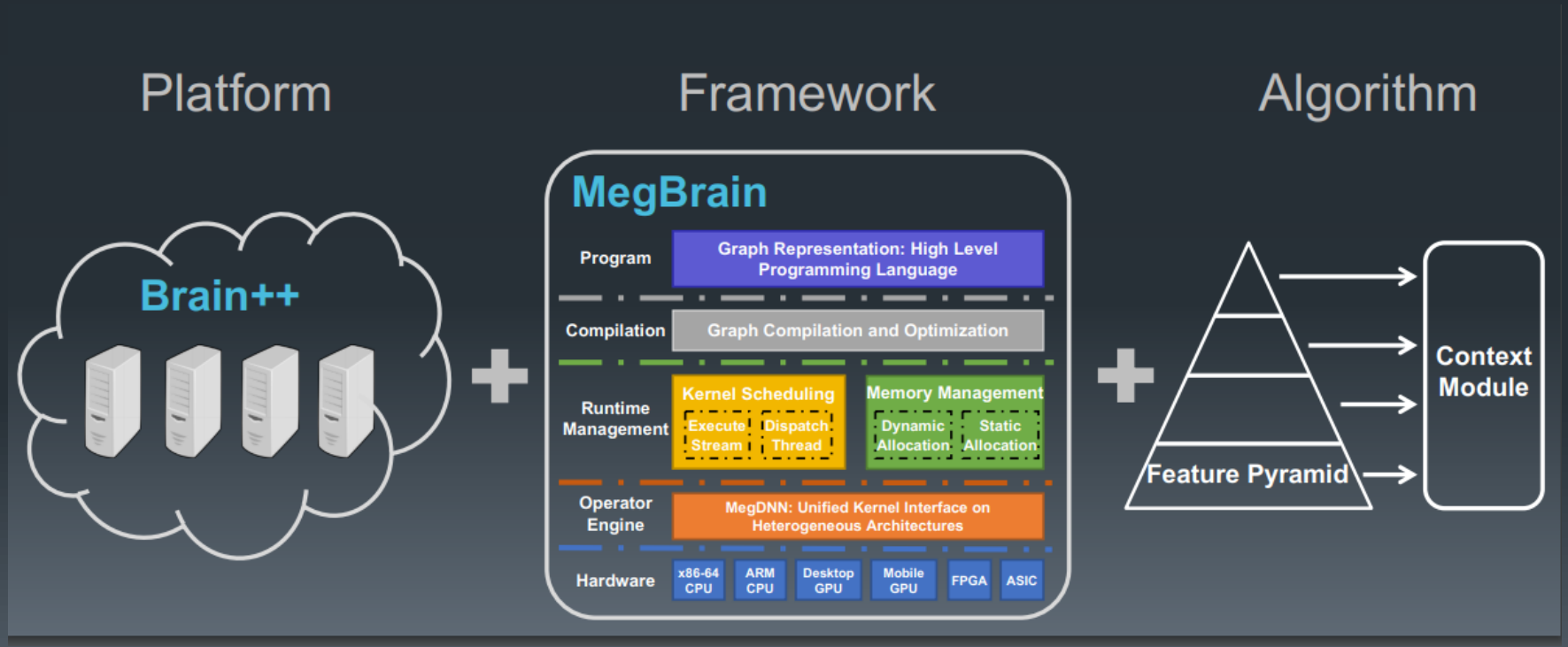
2.2 Our solution



Valid Training Region

Network	*Scale*	mAP_{50}	mAP_{75}	mAP_s	mAP_m	mAP_l	mAP
Mask R-CNN [COCO]	[1500, 1800]	28.1	16.8	7.5	26.9	36.8	16.9
Mask R-CNN [COCO]	[1800, 2400]	29.9	18.3	9.2	27.5	40.0	18.3
Mask R-CNN [COCO]	VTR	30.3	19.5	9.1	30.5	42.8	18.9

2.3.1 Our solution



2.3.2 Our solution

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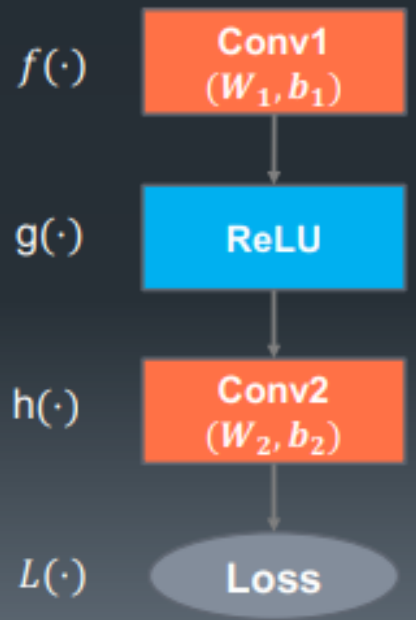
Sublinear Memory



$$h(\cdot) = g(f(x)) \qquad \frac{\partial L}{\partial W_2} = \frac{\partial L}{\partial h}\frac{\partial h}{\partial W_2}$$

$$\frac{\partial L}{\partial W_2} = \frac{\partial L}{\partial g(f(x))}\frac{\partial g(f(x))}{\partial W_2}$$

We can compute the $h(\cdot)$ in BP and thus don't need to store the Conv2!

[T. Chen et al, Arxiv'16]

Some Results on Local Val

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Network	*COCO*	*PA*	*VTR*	*FI*	mAP_{50}	mAP_{75}	mAP_s	mAP_m	mAP_l	*mAP*
Mask R-CNN					25.4	15.1	7.1	23.1	35.9	15.2
Mask R-CNN	✓				28.1	16.8	7.5	26.9	36.8	16.9
Mask R-CNN	✓	✓			29.9	18.3	9.2	27.5	40.0	18.3
Mask R-CNN	✓	✓	✓		30.3	19.5	9.1	30.5	42.8	18.9
Mask R-CNN	✓	✓	✓	✓	34.3	21.5	10.6	33.1	44.0	21.2

Some Results on Test

Network	*Backbone*	*mAP*
Mask R-CNN	ResNet-50	26.7
Our TIS	ResNet-50	29.0
Our TIS	SENet-152	31.9
Our TIS + MS	ResNet-PSPNet-152	32.4
Our TIS + MS	2*ResNet-PSPNet-152	32.8
Our TIS + MS	+SENet 152	**33.9**
Second in leaderboard	unknown	30.2
Third in leaderboard	unknown	26.7

Some Visual Results

1）Remote Small Objects

2）Riders and Pedestrian
Riders are not included in this challenge

Some Visual Results

Thanks ~

Welcome to Join Megvii