



# Real-time Semantic Segmentation via Region and Pixel Context Network

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## Introduction

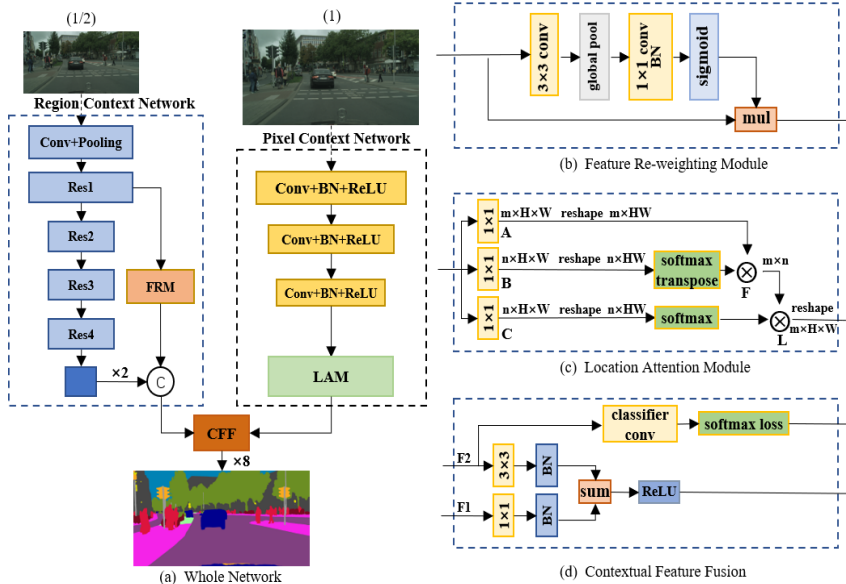
We propose a Dual Context Network for real-time semantic segmentation which improves the performance of accuracy and speed. The DCNet contains two sub-networks: Region Context Network and Pixel Context Network.

## Contribution

- Two sub-networks take different resolution images to accomplish semantic prediction and detail information recovery respectively.
- Feature Re-weighting Module is designed to integrate more context information and Location Attention Module is designed to model spatial interdependencies. In addition, we present Contextual Feature Fusion to further improve the accuracy.
- Experiments prove superior performance of our method through comparison with a number of state-of-the-art networks on the benchmarks of Cityscapes and CamVid.

## Approach

In the Region Context Network, 1/2 resolution image is fed into the backbone to speed up without much precision sacrifice. Then the Feature Re-weighting Module changes the weights of low-level channels to enhance the consistency. Besides, a shallow network is designed with only three convolution layers and a Location Attention Module, which captures pixel context information for each pixel.



## Experiment

Performance on Cityscapes test dataset

Method	Input Size	Time(ms)	Frame(fps)	mIoU(%)
SegNet	640 × 360	16	16.7	57
ENet	640 × 360	7	135.4	57
ESPNet	1024 × 512	9	112	60.3
ICNet	1024 × 2048	33	30.3	69.5
TwoColumn	512 × 1024	68	14.7	72.9
BiSeNet1	768 × 1536	13	72.3	68.4
BiSeNet2	768 × 1536	21	45.7	74.7
DFANet A	1024 × 1024	10	100	71.3
DFANet B	1024 × 1024	8	120	67.1
SwiftNet	1024 × 2048	25	39.9	75.5
Ours(Res50)	512 × 1024 (1024 × 2048)	12	82	<b>76.1</b>
Ours(Res18)	512 × 1024 (1024 × 2048)	7	<b>142</b>	71.2

Performance on CamVid test dataset

Method	Frame(fps)	mIoU(%)
SegNet	46	46.4
ICNet	27.8	67.1
ENet	-	51.3
BiSeNet1	-	65.6
BiSeNet2	-	68.7
DFANet A	120	64.7
DFANet B	160	59.3
SwiftNet	-	73.86
Ours(Res50)	91	70.8
Ours(Res18)	<b>166</b>	66.2