U2Net

U^2-Net: Going Deeper with Nested U-Structure for Salient Object Detection

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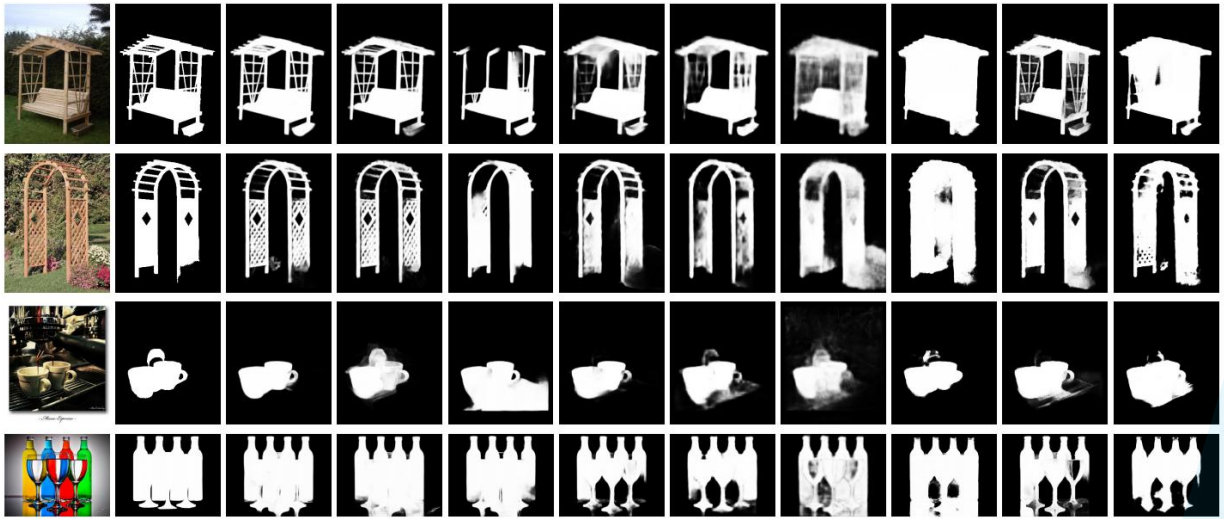

CVPR 2020

SOD任务

salient object detection

论文地址：https://arxiv.org/abs/2005.09007
博文地址：https://blog.csdn.net/qq_37541097/article/details/126255483
公众号“阿喆学习小记”输入u2net获取

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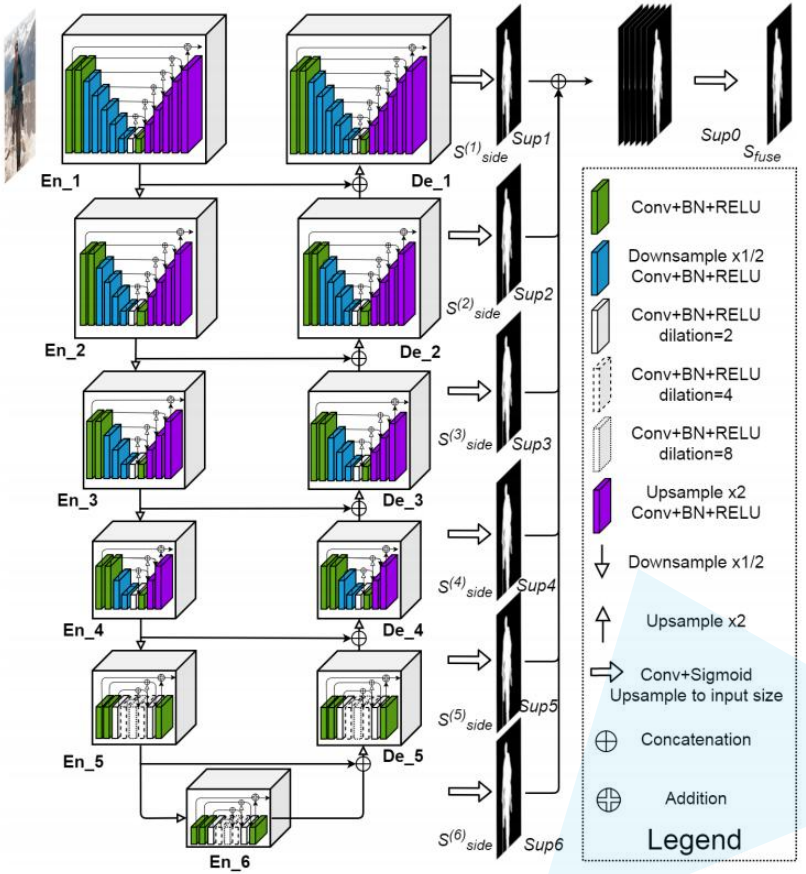
目录



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前言

SOD的任务是将图片中最吸引人的目标或区域分割出来

二分类任务

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前言

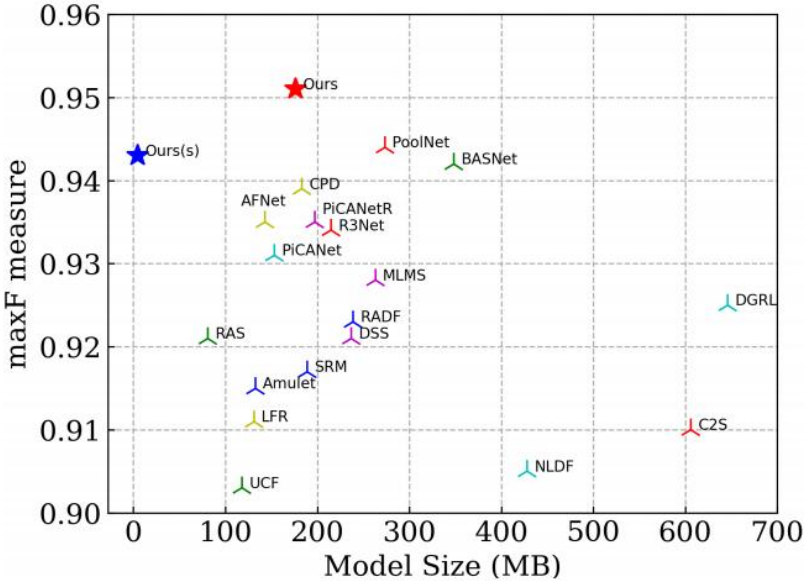

Figure 1. Comparison of model size and performance of our U^2-Net with other state-of-the-art SOD models. The $maxF_\beta$ measure is computed on dataset ECSSD [46]. The red star denotes our U^2-Net (Ours) (176.3 MB) and the blue star denotes our small version U^2-Net† (Ours†) (4.7 MB).

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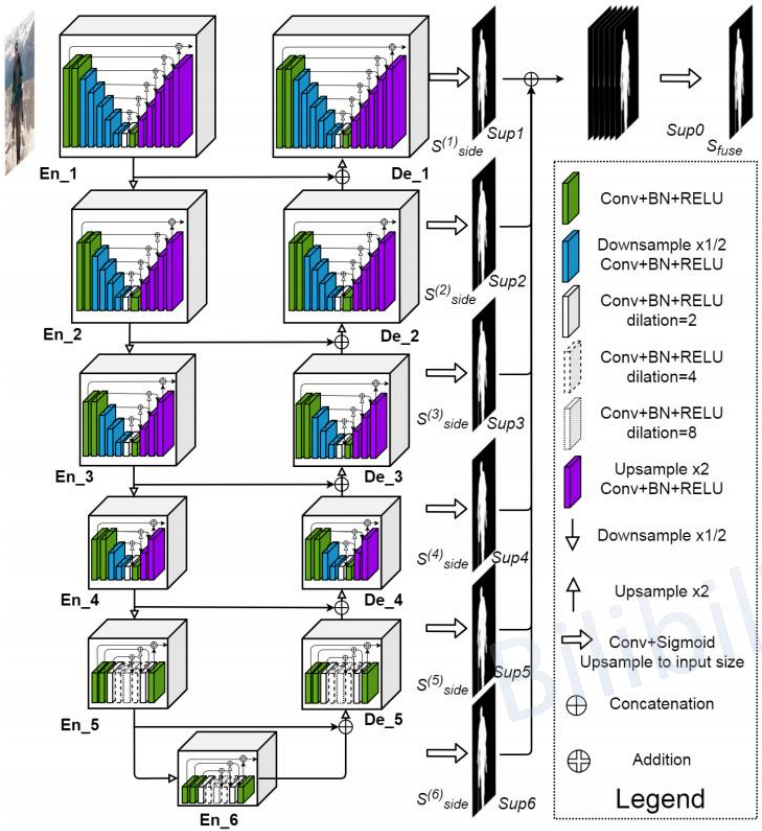
网络结构解析



$U^2 - Net$

ReSidual U-block

在Encoder阶段，每通过一个block后都会下采样2倍(maxpool)，在Decoder阶段，每通过一个block前会上采用2倍(bilinear)

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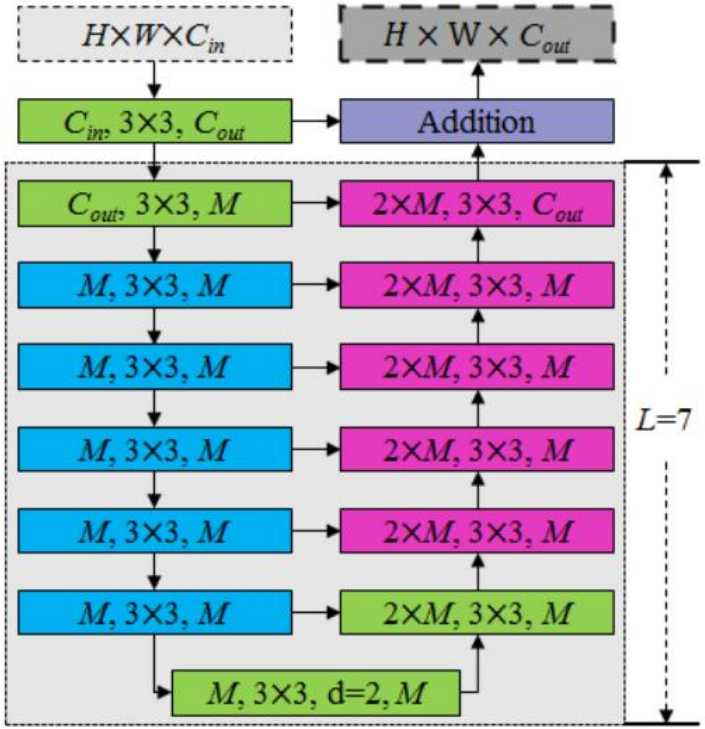
网络结构解析



(e) RSU-$L(C_{in}, M, C_{out})$

RSU-7

Conv+BN+ReLU

Conv+BN

Downsample + Conv+BN+ReLU

Upsample + Conv+BN+ReLU

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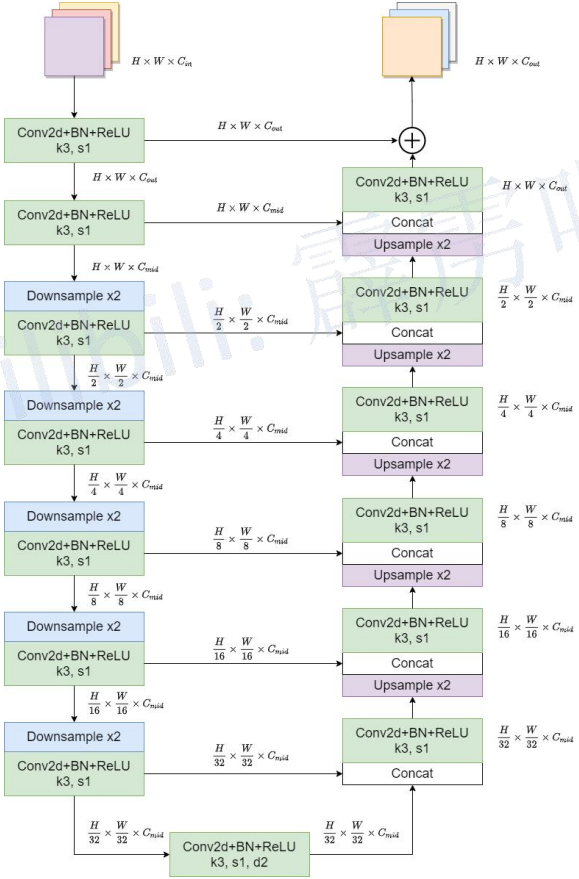
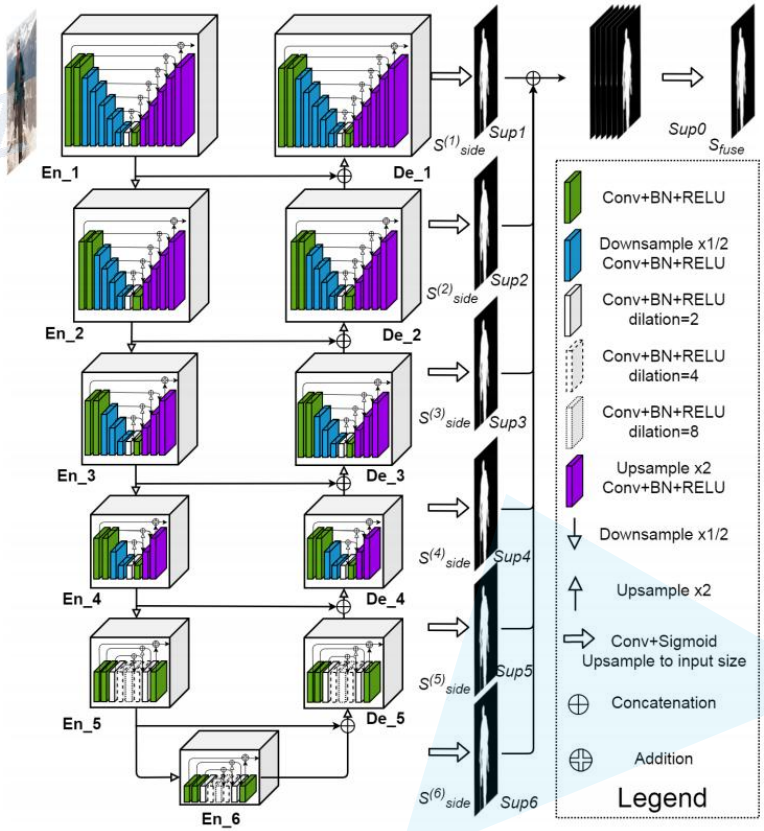
网络结构解析

RSU-7





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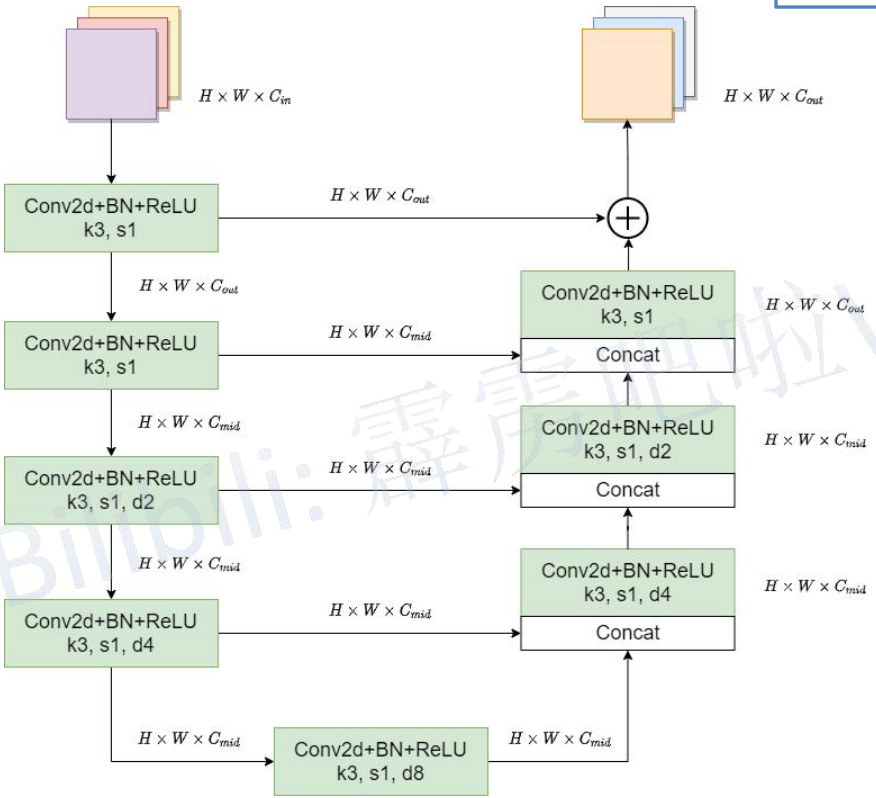
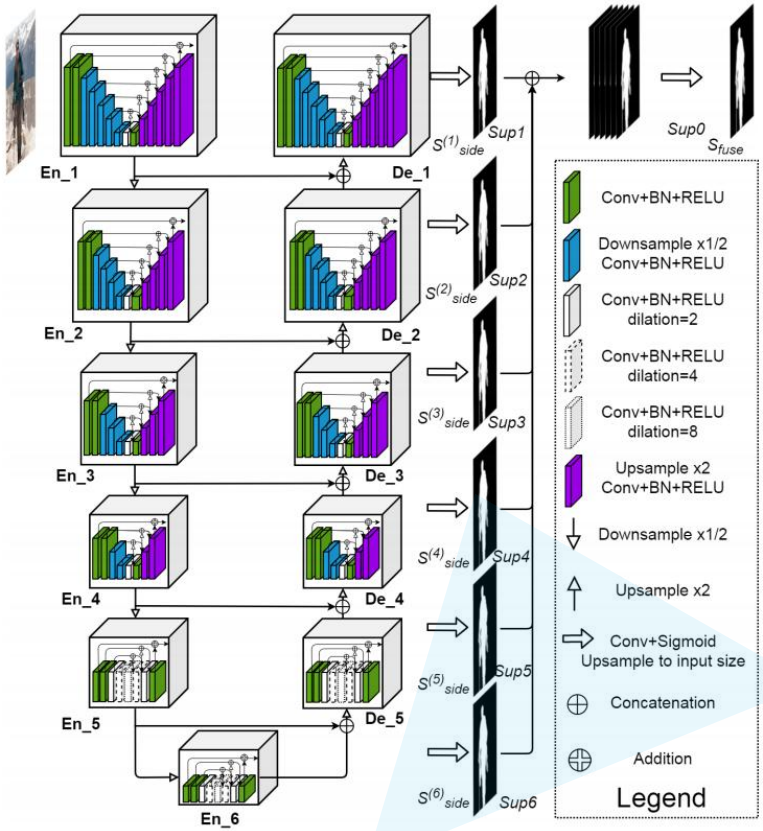
网络结构解析

RSU-4F





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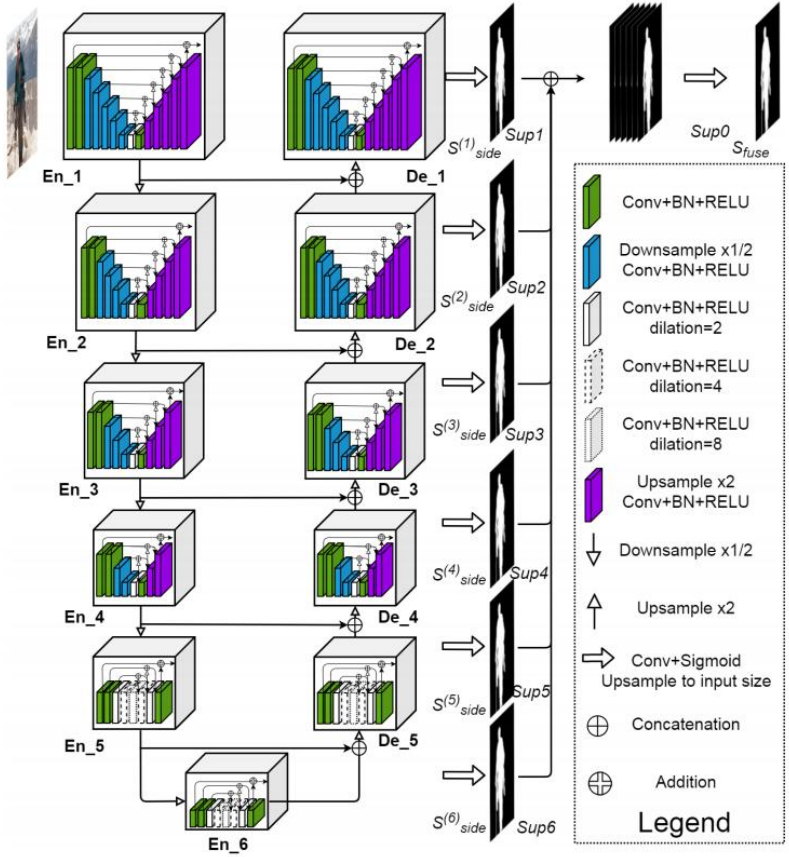
网络结构解析



saliency map fusion module

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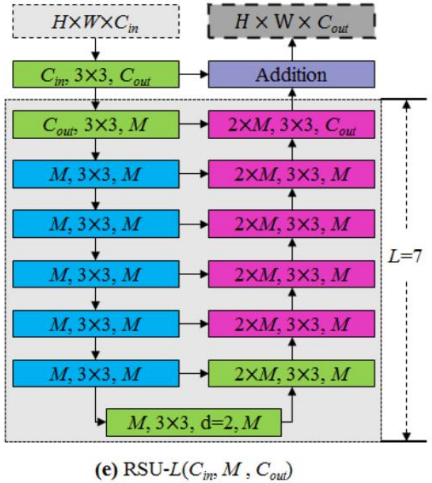
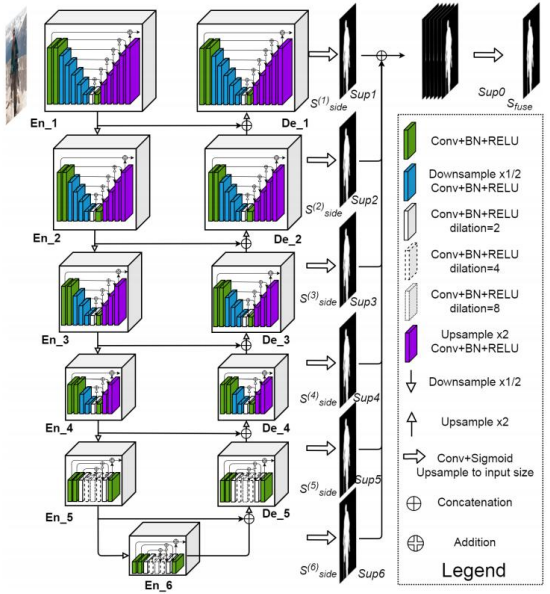
网络结构解析



(e) RSU-$L(C_{in}, M, C_{out})$



Architecture with different blocks	Stages										
	En_1	**En_2**	**En_3**	**En_4**	**En_5**	**En_6**	**De_5**	**De_4**	**De_3**	**De_2**	**De_1**
U^2-Net (**Ours**)	RSU-7 I:3 M:32 O:64	RSU-6 I:64 M:32 O:128	RSU-5 I:128 M:64 O:256	RSU-4 I:256 M:128 O:512	RSU-4F I:512 M:256 O:512)	RSU-4F I:512 M:256 O:512)	RSU-4F I:1024 M:256 O:512	RSU-4 I:1024 M:128 O:256	RSU-5 I:512 M:64 O:128	RSU-6 I:256 M:32 O:64	RSU-7 I:128 M:16 O:64
U^2-Net† (**Ours**†)	RSU-7 I:3 M:16 O:64	RSU-6 I:64 M:16 O:64	RSU-5 I:64 M:16 O:64	RSU-4 I:64 M:16 O:64	RSU-4F I:64 M:16 O:64	RSU-4F I:64 M:16 O:64	RSU-4F I:128 M:16 O:64	RSU-4 I:128 M:16 O:64	RSU-5 I:128 M:16 O:64	RSU-6 I:128 M:16 O:64	RSU-7 I:128 M:16 O:64

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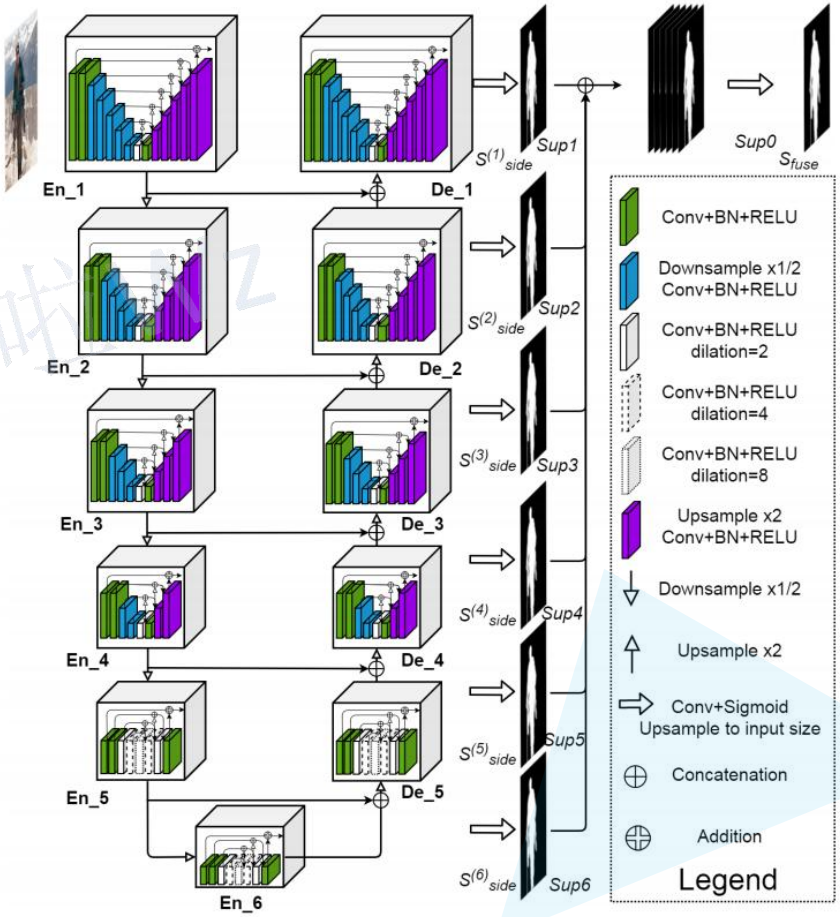
损失计算

$$L = \sum_{m=1}^{M} w_{side}^{(m)} l_{side}^{(m)} + w_{fuse} l_{fuse}$$

l 代表二值交叉熵损失

w 代表每个损失的权重



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评价指标

- PR curve
- **F-measure**
- **MAE**
- weighted F-measure
- S-measure
- relax boundary F-measure

$$F_\beta = \frac{(1+\beta^2)\times \text{Precision}\times \text{Recall}}{\beta^2\times \text{Precision}+\text{Recall}}$$

$$MAE = \frac{1}{H\times W}\sum_{r=1}^{H}\sum_{c=1}^{W}\left|P(r,c)-G(r,c)\right|$$

(Mean Absolute Error)

预测概率图　GT

DUTS数据集简介

根据官方的介绍，DUTS数据集包含了10553张训练图片，5019张测试图片。其中所有的训练图片采集自ImageNet DET训练/验证集，而所有的测试图片采集自ImageNet DET测试集以及SUN数据集。所有的ground truths(GT)由50个人手动标注。在前言中，我们已经简单展示了DUTS-TR中的部分训练图片以及GT，如下图所示。

DUTS数据集简介

DUTS数据集官方下载地址：http://saliencydetection.net/duts/

如果下载不了，可以通过我提供的百度云下载，
链接: https://pan.baidu.com/s/1nBI6GTN0ZilqH4Tvu18dow 密码: r7k6

其中DUTS-TR为训练集，DUTS-TE是测试（验证）集，数据集解压后目录结构如下：

```
├── DUTS-TR
│   ├── DUTS-TR-Image: 该文件夹存放所有训练集的图片
│   └── DUTS-TR-Mask: 该文件夹存放对应训练图片的GT标签（Mask蒙板形式）
└── DUTS-TE
    ├── DUTS-TE-Image: 该文件夹存放所有测试（验证）集的图片
    └── DUTS-TE-Mask: 该文件夹存放对应测试（验证）图片的GT标签（Mask蒙板形式）
```

沟通方式

1.github

https://github.com/WZMIAOMIAO/deep-learning-for-image-processing

2.bilibili

https://space.bilibili.com/18161609/channel/index

3.CSDN

https://blog.csdn.net/qq_37541097/article/details/103482003