

Paper Reading

Jinming Su

Last update: May 24, 2019

Contents

1	Classification	1
1.1	Res2Net: A New Multi-scale Backbone Architecture, arxiv, 2019.	1
2	Object Detection	3
2.1	Proposal	3
2.1.1	Multiscale Combinatorial Grouping for Image Segmentation and Object Proposal Generation. TPAMI, 2016	3
2.2	What Object Should I Use? - Task Driven Object Detection. CVPR, 2019.	4
2.3	Feature Pyramid Networks for Object Detection. CVPR, 2017.	4
2.4	Focal Loss for Dense Object Detection. ICCV, 2017	4
3	Salient Object Detection	5
3.1	DNA: Deeply-supervised Nonlinear Aggregation for Salient Object Detection. arxiv, 2019.	5
3.2	Instance-Level Salient Object Segmentation. CVPR, 2017.	5
3.3	Semantic Instance Meets Salient Object: Study on Video Semantic Salient Instance Segmentation. WACV, 2019.	6
3.4	A Simple Pooling-Based Design for Real-Time Salient Object Detection. CVPR, 2019	6
3.5	S4Net: Single Stage Salient-Instance Segmentation. CVPR, 2019.	6
3.6	Contrast Prior and Fluid Pyramid Integration for RGBD Salient Object Detection. CVPR, 2019	6
4	Semantic Segmentation	7
4.1	WebSeg: Learning Semantic Segmentation from Web Searches. arxiv, 2018.	7
4.2	ADVENT: Adversarial Entropy Minimization for Domain Adaptation in Semantic Segmentation. CVPR, 2019.	7
5	Others	9
5.1	Single Image Haze Removal Using Dark Channel Prior. CVPR, 2009. Best paper.	9
5.2	Single Image Dehazing Using Ranking Convolutional Neural Network. TMM, 2018.	9

Todo list

Chapter 1

Classification

1.1 Res2Net: A New Multi-scale Backbone Architecture, arxiv, 2019.

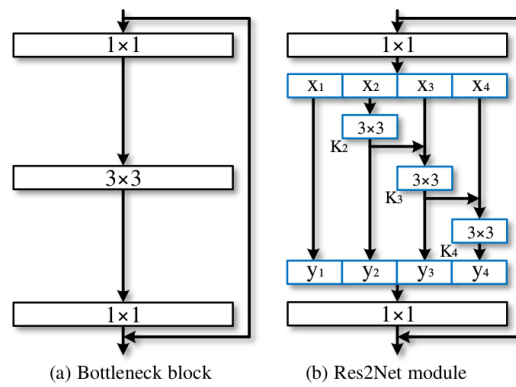


Figure 1.1: Residual Learning.

This paper is mainly a promotion of residual network, which seems to be similar to cardinality, only adding more connections.

Chapter 2

Object Detection

2.1 Proposal

2.1.1 Multiscale Combinatorial Grouping for Image Segmentation and Object Proposal Generation. TPAMI, 2016

I don't read this paper, but the code is tested. Code can be found in <https://github.com/jponttuset/mcg>. When testing, run pre-trained/install.m, pre-trained/demos/demo_im2mcg.m and get the following results.

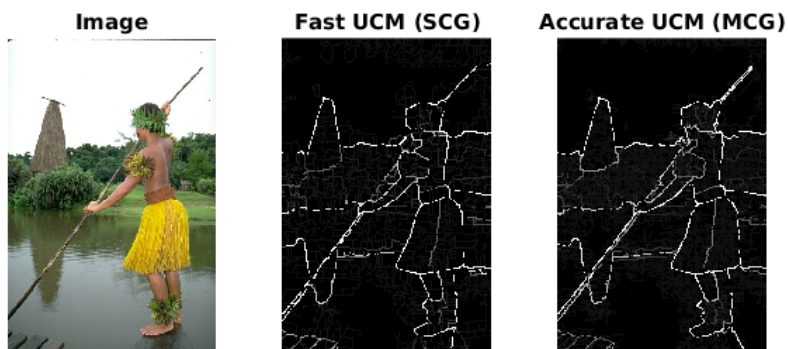


Figure 2.1: The UCM of MCG.

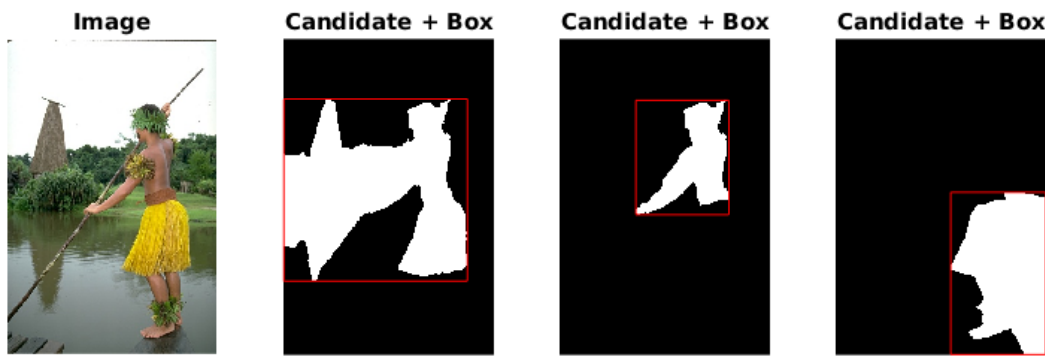


Figure 2.2: The results of MCG.

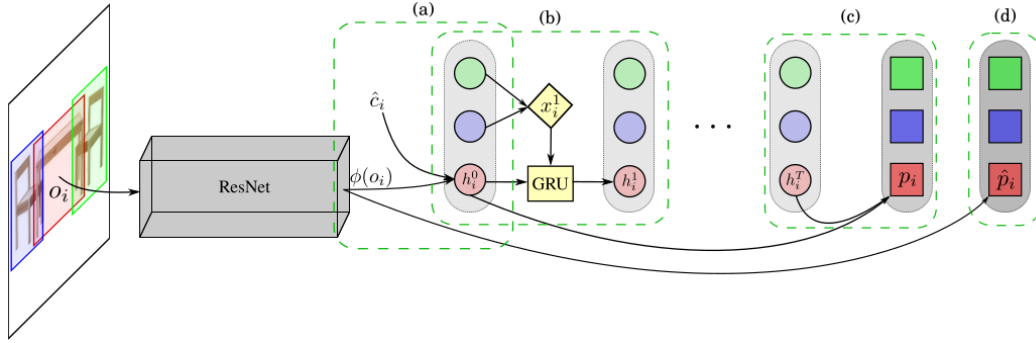


Figure 2.3: GGNN.

2.2 What Object Should I Use? - Task Driven Object Detection. CVPR, 2019.

This paper has two contributions: (1) construct a COCO-Tasks dataset which comprises about 40,000 images where the most suitable objects for 14 tasks have been annotated; (2) proposes a method building on Gated Graph Neural Network to detect the most suitable objects for a given task.

2.3 Feature Pyramid Networks for Object Detection. CVPR, 2017.

This paper propose a new backbone network.

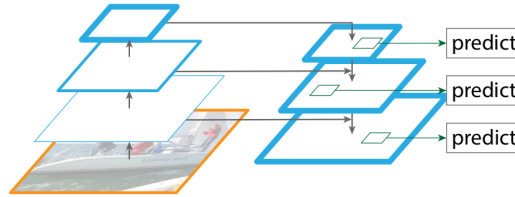


Figure 2.4: Structure of FPN.

2.4 Focal Loss for Dense Object Detection. ICCV, 2017

This paper propose a improved cross entropy loss.

$$\mathcal{FL}(p, y) = \begin{cases} -\alpha(1-p)^\gamma \log(p), & y = 1 \\ -(1-\alpha)p^\gamma \log(1-p), & y = 0 \end{cases} \quad (2.1)$$

where α is the weighting factor for class imbalance, and p_t is the confidence

Chapter 3

Salient Object Detection

3.1 DNA: Deeply-supervised Nonlinear Aggregation for Salient Object Detection. arxiv, 2019.

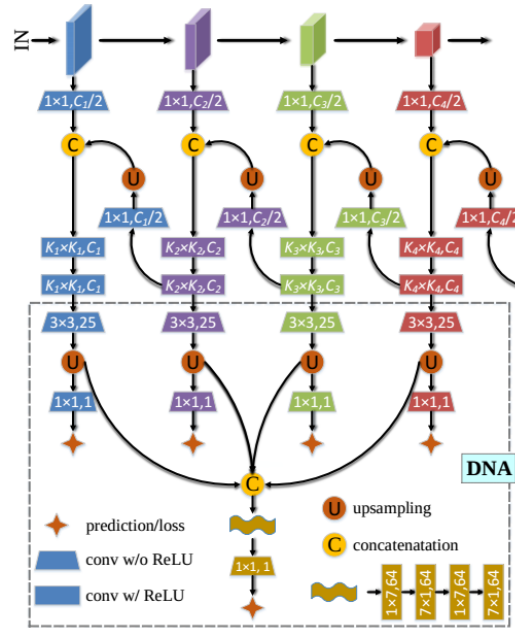


Figure 3.1: Residual Learning.

This paper has two contributions: (1) theoretically and experimentally analyzes the natural limitaion of traditional side-output aggregation which can only make limited use of multi-scale side-ouput informantion; (2) proposes Deeply-supervised nonlinear aggregation (DNA) for side-output features. (3) as experience, in DNA, convolution layers with kernels of $n \times 1$ and $1 \times n$ are used, which is proved to be effective. Moreover, authors claim that large kernel size in DNA can improve performance.

3.2 Instance-Level Salient Object Segmentation. CVPR, 2017.

This paper has contributions as follows: (1) introduce a new task of instance-level salient object detection, and construct a corresponding dataset with 1000 images that are collected from existing SOD datasets; (2) propose a method for this task as shown in figure.

Moreover, the code can be found in <http://www.sysu-hcp.net/instance-level-salient-object-segmentation/> while the code is only the part of SOD without contour and instance.

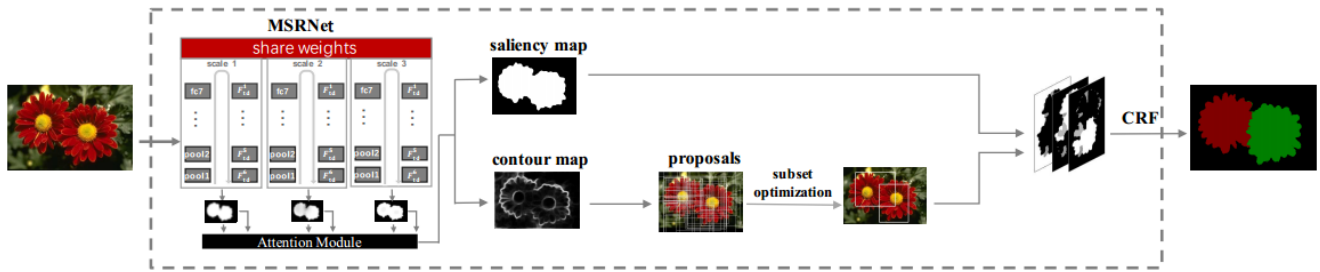


Figure 3.2: Instance-level salient object detection.

- 3.3 Semantic Instance Meets Salient Object: Study on Video Semantic Salient Instance Segmentation. WACV, 2019.
- 3.4 A Simple Pooling-Based Design for Real-Time Salient Object Detection. CVPR, 2019
- 3.5 S4Net: Single Stage Salient-Instance Segmentation. CVPR, 2019.
- 3.6 Contrast Prior and Fluid Pyramid Integration for RGBD Salient Object Detection. CVPR, 2019

Chapter 4

Semantic Segmentation

4.1 WebSeg: Learning Semantic Segmentation from Web Searches. arxiv, 2018.

This paper propose a method to learning semantic segmenation web searching images. The method is mainly an online

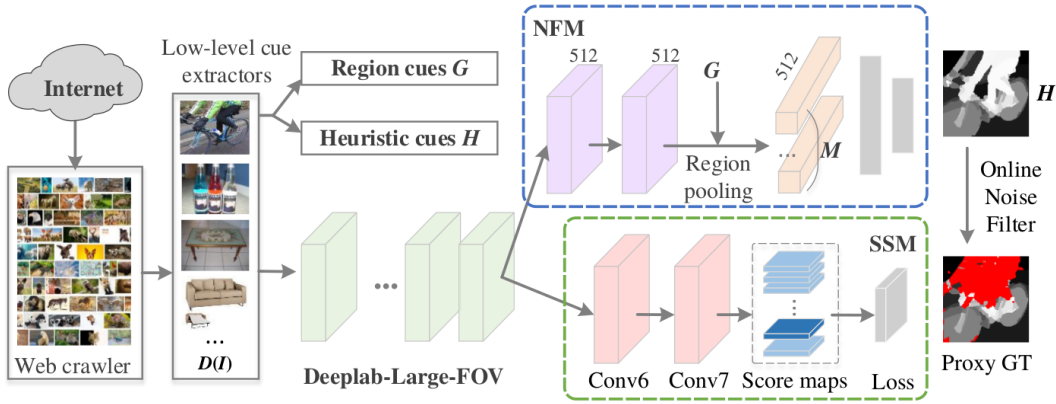


Figure 4.1: Framework.

noise filtering module, which is able to filter potentially noisy region labels to obtain the correct region labeled by the query keywords.

4.2 ADVENT: Adversarial Entropy Minimization for Domain Adaptation in Semantic Segmentation. CVPR, 2019.

This paper focuses on the problem of domain adaptation in semantic segmentation. In detail, the contributions are as follows: (1) propose to minimize the pixel-level entropy of target domain to penalize low-confident predictions on target domain; (2) propose a entropy-based adversarial training approach to provide the structure adaptation; (3) extra two trick: a) training on specific entropy ranges and b) add class-ratio priors.

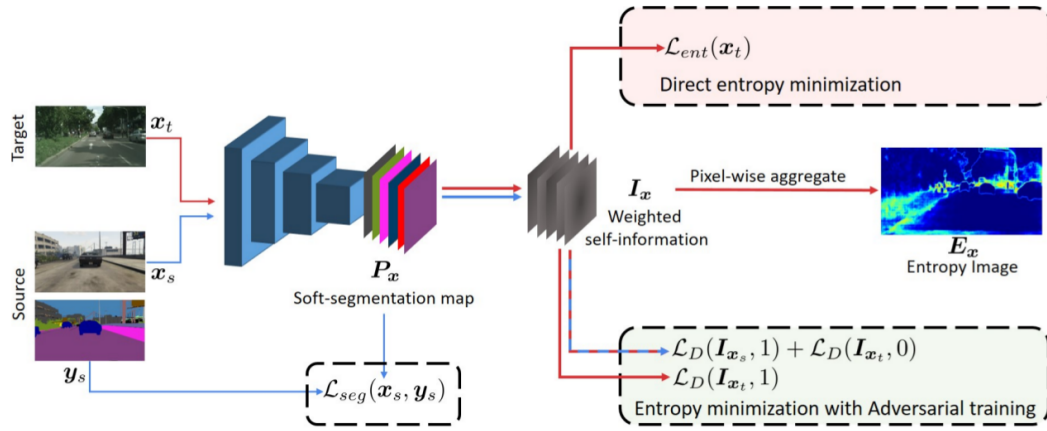


Figure 4.2: Advsarial entropy.

Chapter 5

Others

5.1 Single Image Haze Removal Using Dark Channel Prior. CVPR, 2009. Best paper.

This paper introduces dark channel prior that is an observation -most local patches in haze-free outdoor images contain some pixels which have very low intensities in at least one color channel. This is the one of most famous papers in the domain of dehazing.

Some formulas in this paper are easy to understand. One can refer to <https://www.cnblogs.com/Imageshop/p/3281703.html> for more understanding.

The unofficial python code can be found in <https://github.com/su526664687/dark-channel-prior-dehazing>.

5.2 Single Image Dehazing Using Ranking Convolutional Neural Network. TMM, 2018.

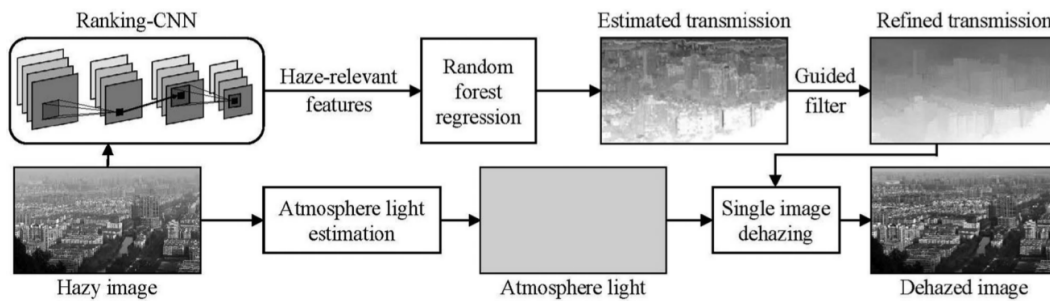


Figure 5.1: GGNN.

This paper presents a ranking cnn to deal with dehazing. The ranking-cnn mainly means a ranking layer. In this layer, the values in a feature map are ranked, and the same operation is conducted for each feature map. Moreover, this paper introduce a method to synthesise haze images.

[1]

Bibliography

- [1] Jinming Su. For convenient compile. In Nothing, 2019.