

#### **Problem:**

The goal in salient object detection is to identify the most visually distinctive objects or regions in an image and then segment them out from the background.



### **FCN-Based Methods:**

- Illustration of different architectures. (a) Hypercolumn [1], (b) FCN-8s [2], (c) HED [3], (d) and (e) different patterns of our proposed architecture.
- > A series of short connections are introduced in our architecture

for combining the advantages of both deeper layers and shallower layers. While our approach can be extended to a variety of different structures, we just list two typical ones.



# Deeply Supervised Salient Object Detection with Short Connections Qibin Hou<sup>1</sup>, Ming-Ming Cheng<sup>1</sup>, Xiaowei Hu<sup>1</sup>, Ali Borji<sup>2</sup>, Zhuowen Tu<sup>3</sup>, Philip H. S. Torr<sup>4</sup> <sup>1</sup>Nankai University, <sup>2</sup>UCF, <sup>3</sup>UCSD, <sup>4</sup>Oxford University

#### **Observations:**

- Following HED, we add a stack of side supervisions after each stage to see the different behaviors brought by multi-level features.
- Deeper layers are able second to accurately locate the salient objects while lower layers encode rich detailed features refinement.



### The Architecture of Our DSS:

- Introducing short connectthe skip-layer ions to structure within the HED architecture.
- > High-level features can be transformed to shallower side-output layers.
- Shallower side-output can help refine the sparse and irregular prediction maps side-output deeper from layers.



### **Additional Changes:**

 $\succ$  To enhance the ability No. of each side output, we also add another convolutional two layers with different kernel sizes to each side output.

## **Results and Failure Cases:**





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Layer	1	2	3
conv1_2	$128, 3 \times 3$	$128, 3 \times 3$	$1, 1 \times 1$
conv2_2	$128, 3 \times 3$	$128, 3 \times 3$	$1, 1 \times 1$
conv3_3	$256, 5 \times 5$	$256, 5 \times 5$	$1, 1 \times 1$
conv4_3	$256, 5 \times 5$	$256, 5 \times 5$	$1, 1 \times 1$
conv5_3	$512, 5 \times 5$	$512, 5 \times 5$	$1, 1 \times 1$
pool5	$512, 7 \times 7$	$512, 7 \times 7$	$1, 1 \times 1$

Source code: <u>https://mmcheng.net/dss/</u>