Deeply Supervised Salient Object Detection with Short Connections
Qibin Hou¹, Ming-Ming Cheng¹, Xiaowei Hu¹, Ali Borji², Zhuowen Tu³, Philip H. S. Torr⁴
¹Nankai University, ²UCF, ³UCSD, ⁴Oxford University

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.

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 to accurately locate the salient objects while lower layers encode rich detailed features which are required for refinement.

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.

The Architecture of Our DSS:
➢ Introducing short connections to the skip-layer 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 from deeper side-output layers.

Additional Changes:
➢ To enhance the ability of each side output, we also add another two convolutional layers with different kernel sizes to each side output.

Results and Failure Cases:

Source code: https://mmcheng.net/dss/