

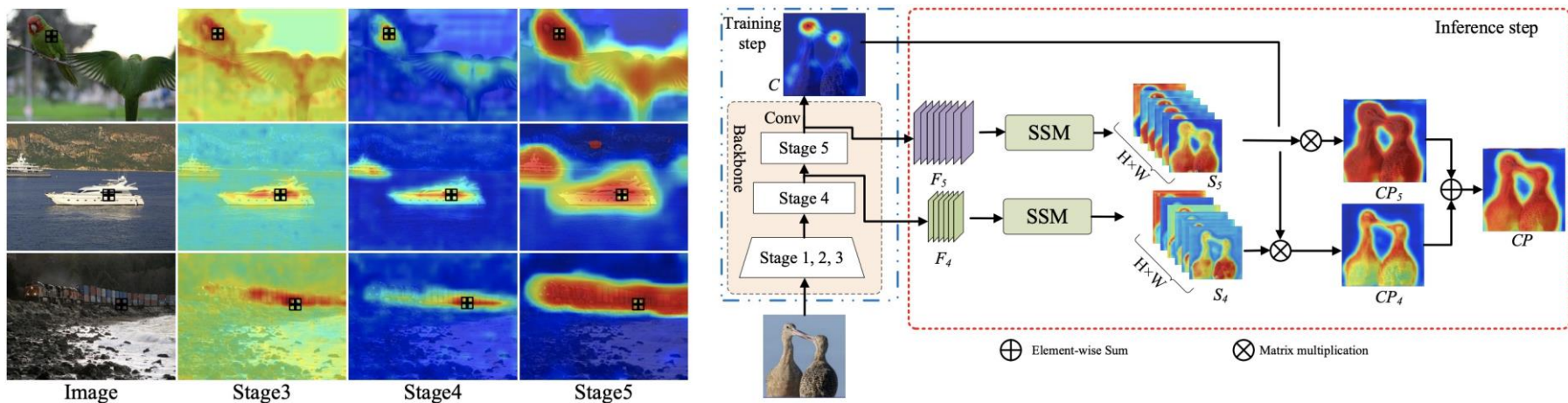
SSA: Semantic Structure Aware Inference on CNN Networks for Weakly Pixel-Wise Dense Predictions without Cost

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Prombles & Ideas

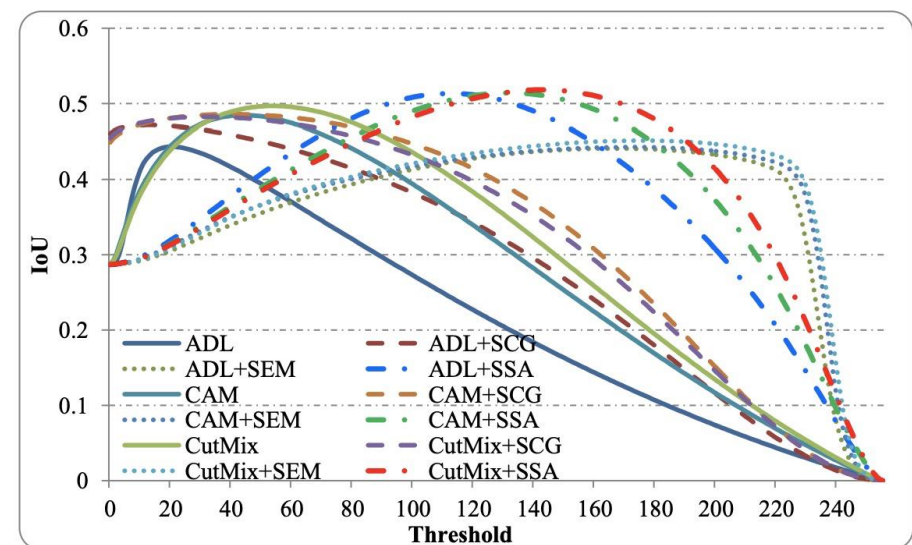
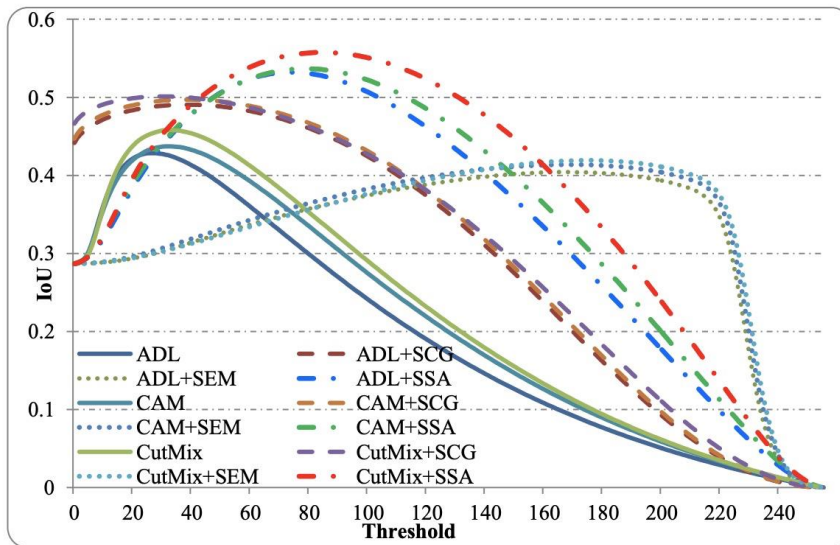
- Problems of conventional expand CAM methods:
 - Existing approaches can only capture the most discriminative regions in image, and cannot obtain the detailed features from the image.
 - Overlooking the concealed semantic structure information within the CNN network hinders the assistance it provides to expanding CAM.
- Ideas: Uncovering semantic structure information embedded in CNN networks, leveraging it to expand CAM without incurring additional training costs.



Left: visualizations of the semantic structure information in backbone stages. Pixels of the same class as the marked pixel are brightly colored. The brighter the color, the higher the similarity. Right: the overall network architecture of the proposed semantic structure aware inference (SSA). Since SSA is only used in the inference CAM stage, it is suitable for all CNN-based models.

Main Contributions

- Contributions:
 - This paper first unveils the existence of semantic structure information in CNN networks, enabling a deeper understanding of relationships and semantics among objects in a scene ;
 - The Semantic Structure Modeling (SSM) module is employed to extract hidden semantic structure information from the feature map, revealing the clear semantic correlations between pixels;
 - Semantic Structure Aware inference (SSA) is introduced as a novel parameter-free method to enhance the quality of CAM.



Compared results in terms of IoU curve on the ILSVRC dataset. Left: the IoU curve results based on VGG16; Right: the IoU curve results based on Inception V3.