Improved variants of Score-CAM via Smoothing and Integrating

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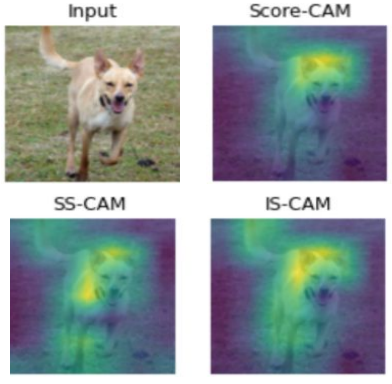
INTRODUCTION

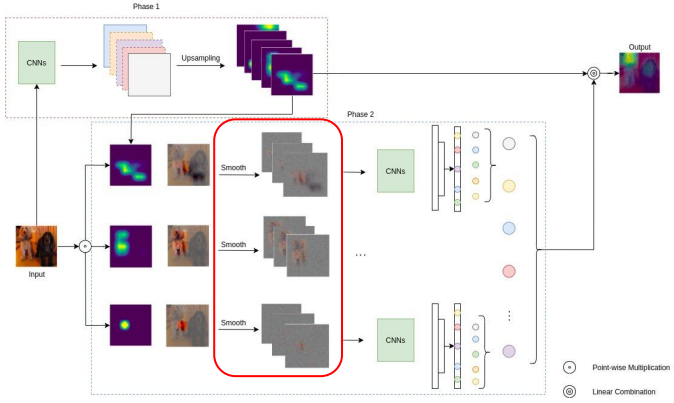
- Class Activation Mappings (CAMs) highlight the features that contribute to the output of the model.

- We present two new variants of Score-CAM:-
> First, by a smoothing function to generate localised features.
> Second, through an Integration function to furnish sharper axiomatic-based attribution maps.

- We visually demonstrate that our methods significantly assist in interpreting models by providing concentrated heatmaps and concrete decision-related features.



METHODOLOGY



SS-CAM Pipeline (IS-CAM Involves the integration function)

$$L^c = ReLU\left(\sum_k \alpha_k^c A_l^k\right)$$

$where$

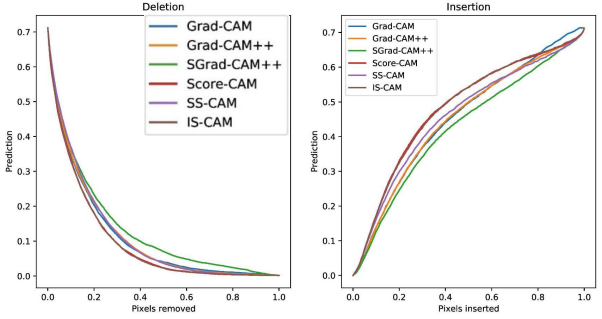
$$\alpha_k^c = \frac{\sum_1^N (C(M))}{N} \qquad for\ SS{-}CAM$$

$$\alpha_k^c = \frac{\sum_{i=1}^N (C(M_i))}{N} \qquad for\ IS{-}CAM$$

$$M_{i+1} \leftarrow M_i + \left((X_0 * A_l^k) * \frac{i}{N}\right)$$

SS-CAM & IS-CAM Equations

EXPERIMENTS



Average AUC Insertion and Deletion curves

CAM Techniques	VGG-16		Resnet		SqueezeNet	
	Avg Drop%	Avg Inc%	Avg Drop%	Avg Inc%	Avg Drop%	Avg Inc%
Score-CAM	66.03	51.85	**64.23**	53.55	13.42	60.85
SS-CAM	79.15	51.30	64.53	**54.80**	**12.06**	**64.85**
IS-CAM	**63.30**	**52.35**	64.85	53.50	13.00	62.15

Average Drop and Average Increase % Scores

CONCLUSION

- Generated concentrated heatmaps with concrete decision related features

References:
1) Wang, H., Wang, Z., Du, M., Yang, F., Zhang, Z., Ding, S., Mardziel, P. and Hu, X., 2020. Score-CAM: Score-weighted visual explanations for convolutional neural networks. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops* (pp. 24-25).