Guided BackPropagation

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We have implemented guided back-propagation. In the network, we override all the ReLU layers with GuidedRelu method. GuidedRelu clips off the negative gradients to zero and allows only positive gradients to flow back. We take the neuron corresponding to the maximum activation as the neuron of interest and set other neurons in the layer to zero. In order to visualize the reconstructed images, the gradients of the CONV3 (after ReLU layer) is taken w.r.t the inputs and back-propagated to the input layer from CONV3.

We have taken the first 100 images and cherry picked 25 images from them to show the guided BP results. We picked the neuron which had the maximum activation for each of the images and did a guided BP for that neuron w.r.t to the image.
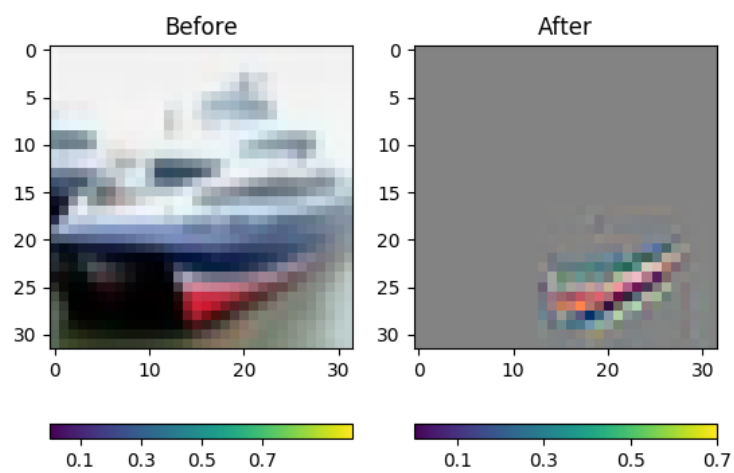
Ships

Figure 1: The colored bottom corner of the boat closer to the sea
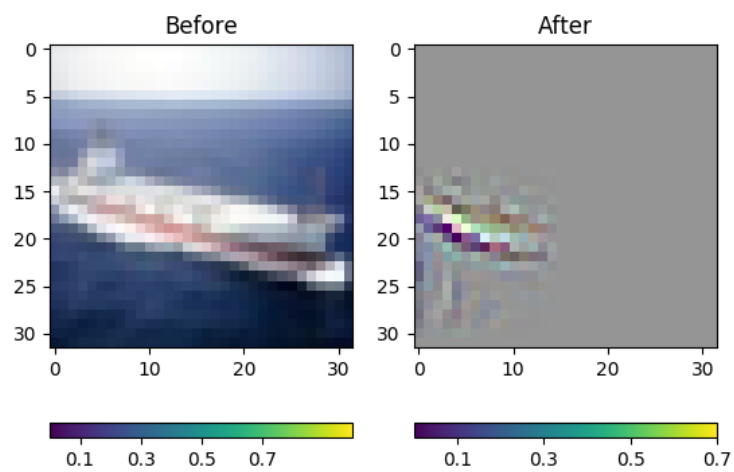

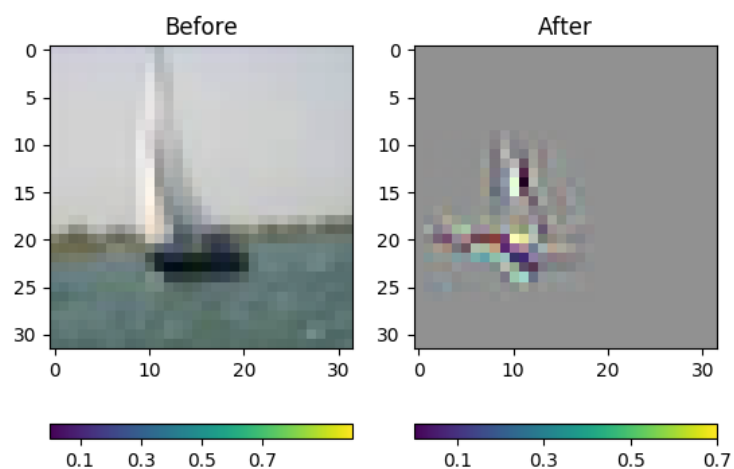Figure 2: The colored bottom corner of the boat closer to the sea
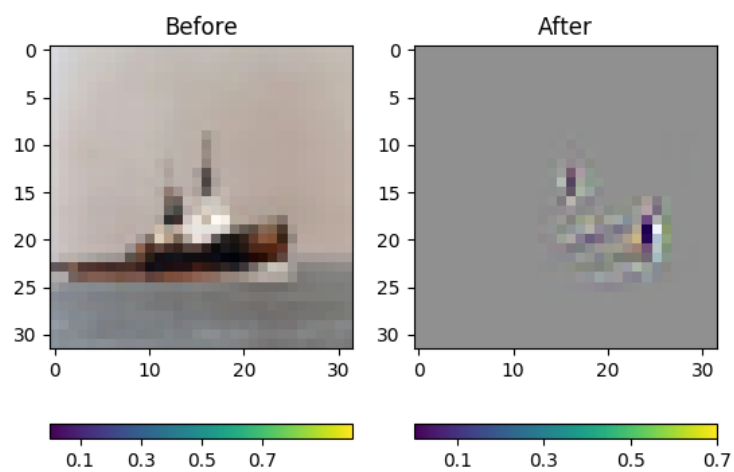
Figure 3: The mast of the yatch

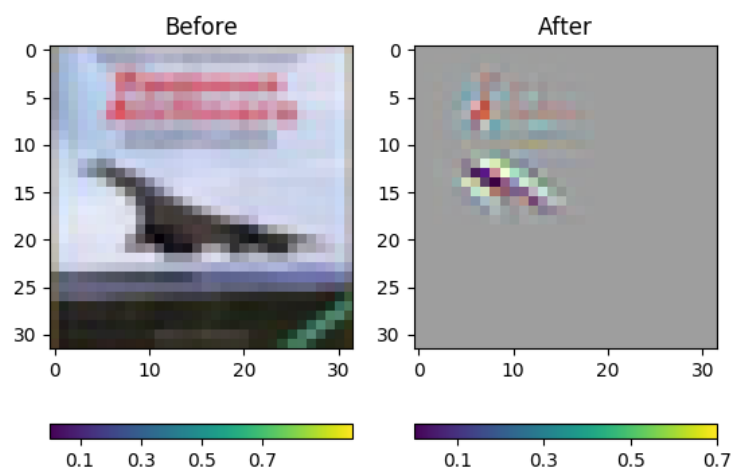Figure 4: The mast of the ship

Aeroplane
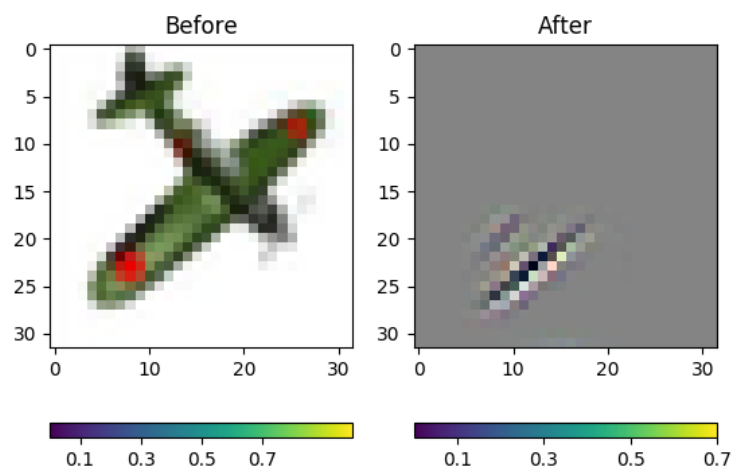

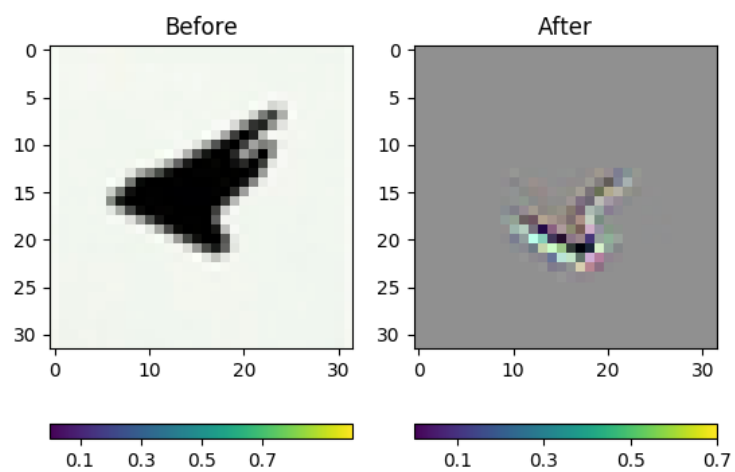Figure 5: Wings of the plane

Figure 6: Wings of the plane

Figure 7: The body of the plane, specifically the shape of wing

Truck

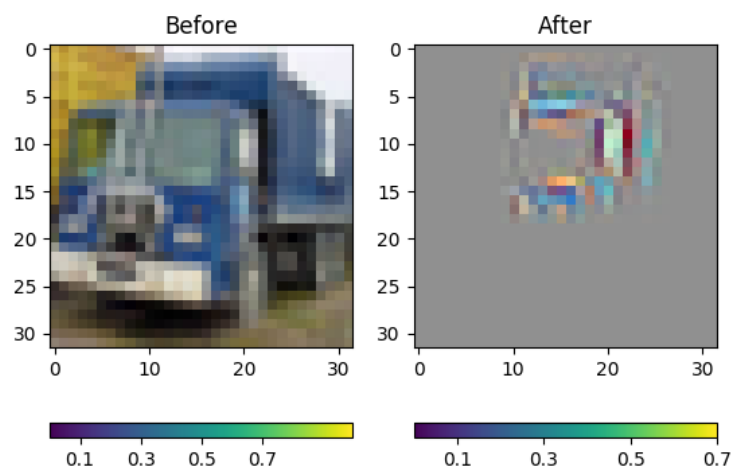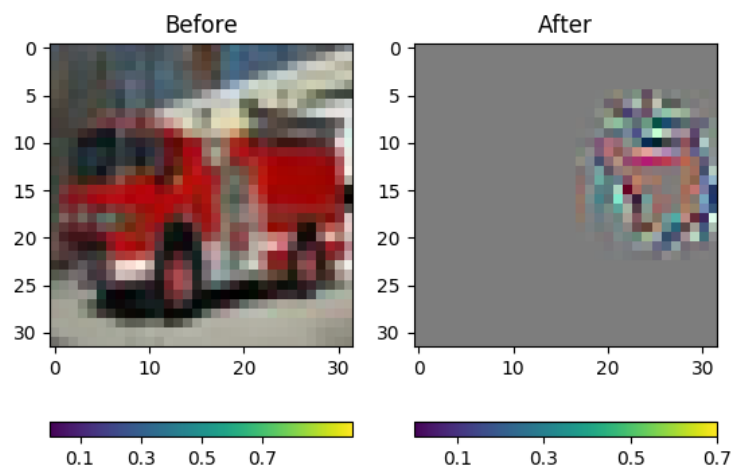Figure 8: Truck's front glass and the body start

Figure 9: same colored region: Body of the truck
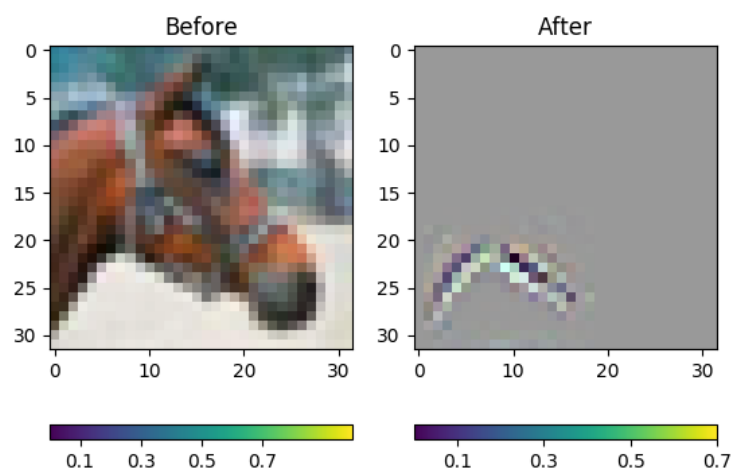
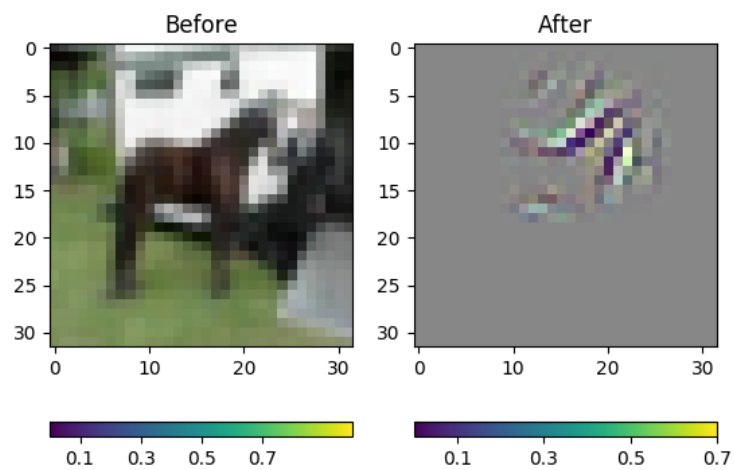**Horse**

Figure 10: The V shape of the horse lower neck

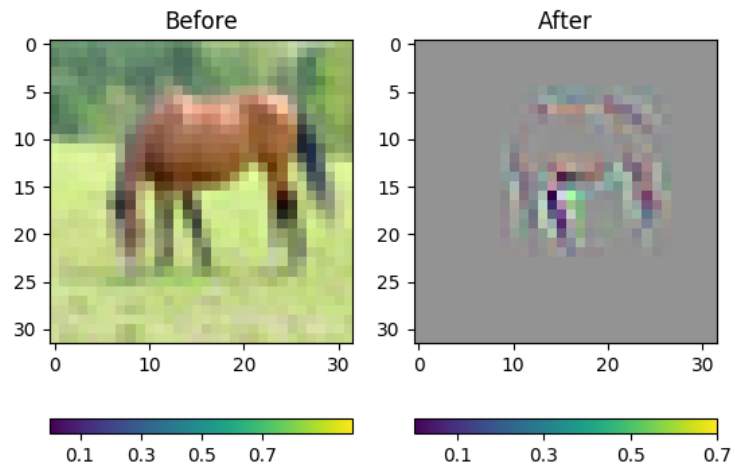
Figure 11: The shape of the horse neck

Horse

Figure 12: The leg and body shape of the horse
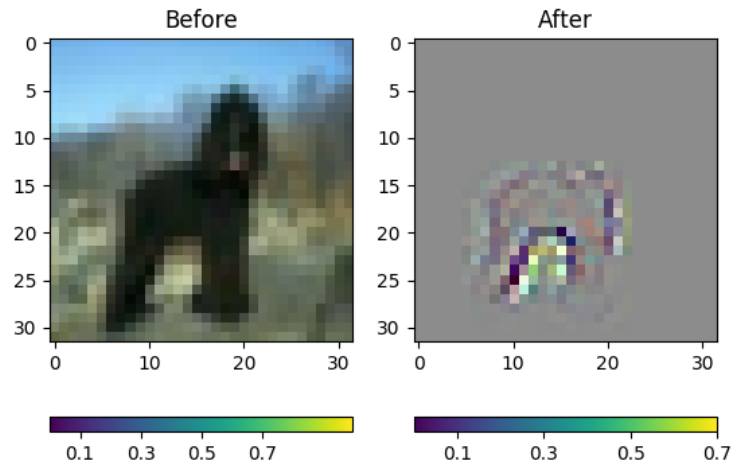
Dog

Figure 13: The leg and body shape of the Dog
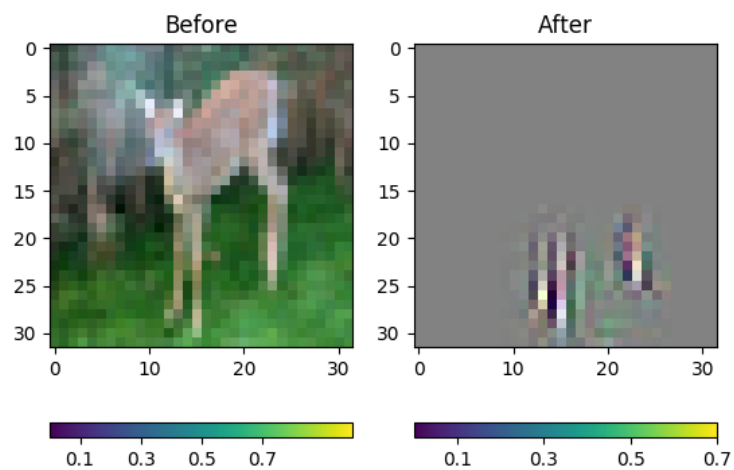
Deer

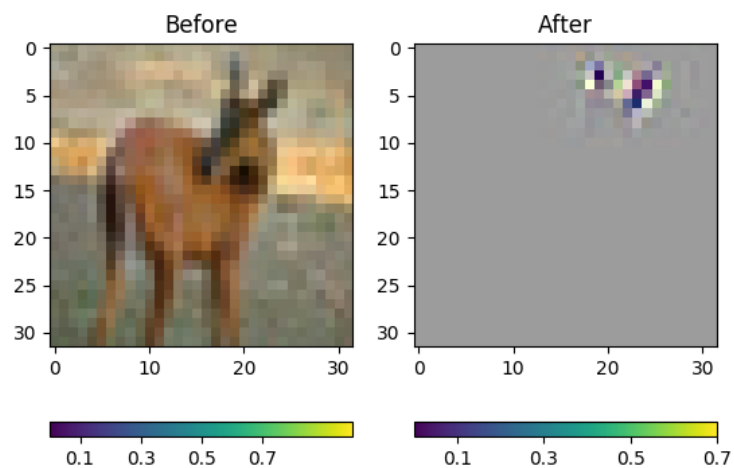

Figure 14: The legs of the deer

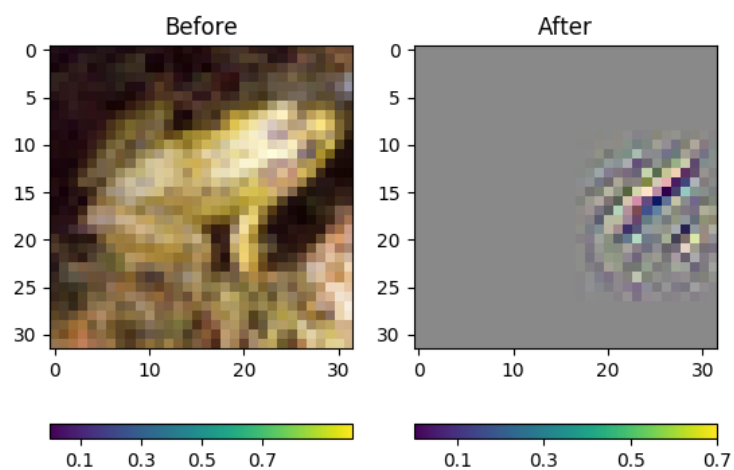Figure 15: The ears of the deer

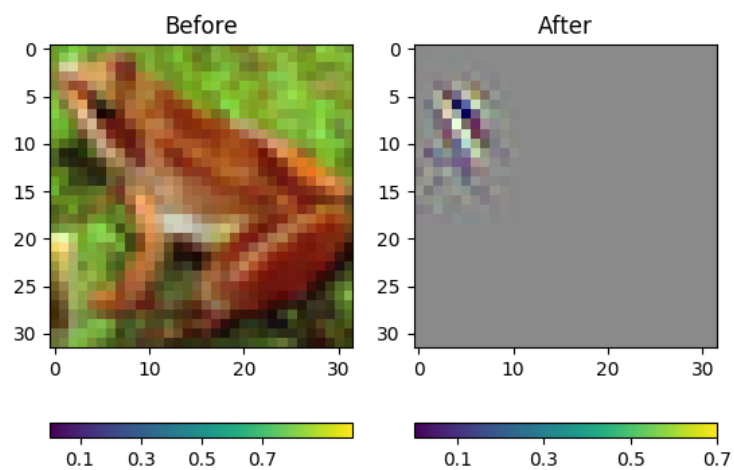**Frog**

Figure 16: The shape of the frog's face

Figure 17: The eye and the frontal region of the face
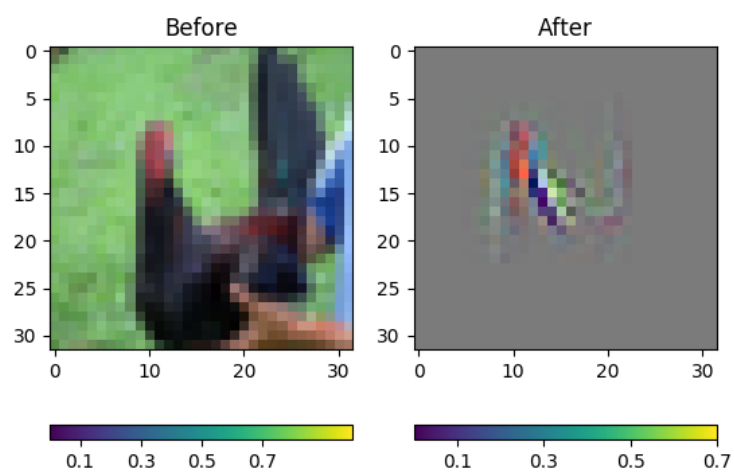
Birds

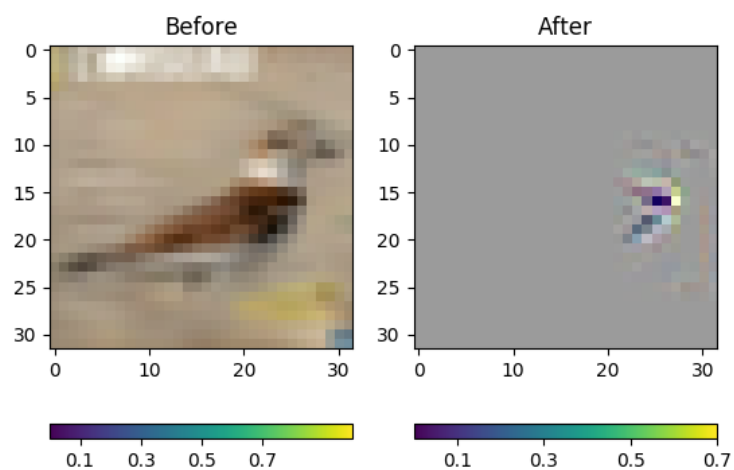Figure 18: The Head and body curve of hen
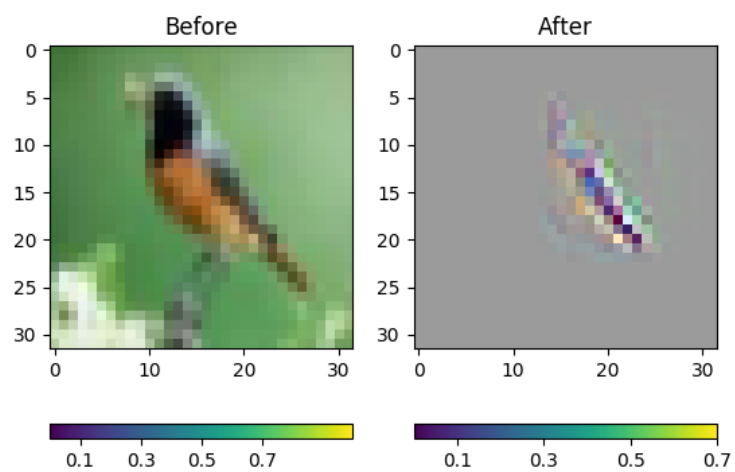

Figure 19: The neck-body curve
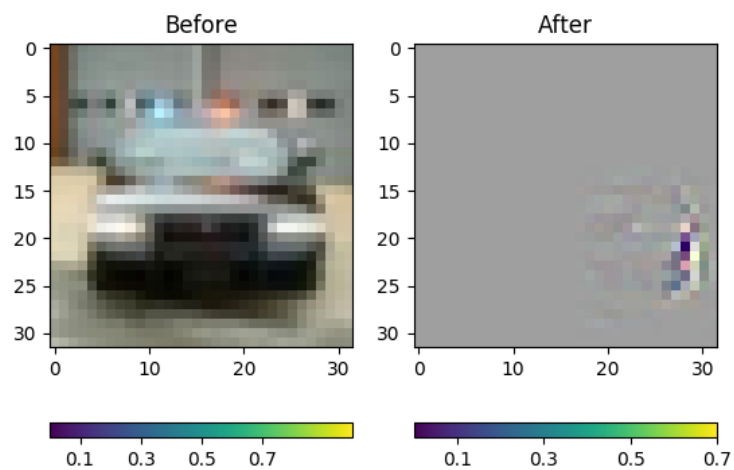
Figure 20: Body of the bird

Cars

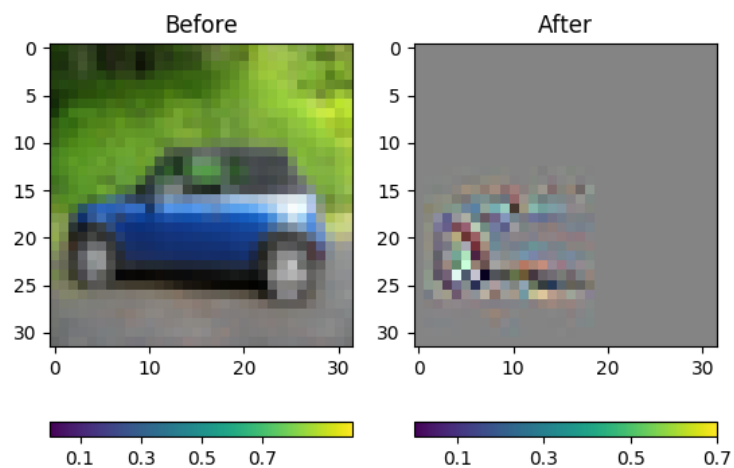Figure 21: Side part of the car, indicator and bonnet

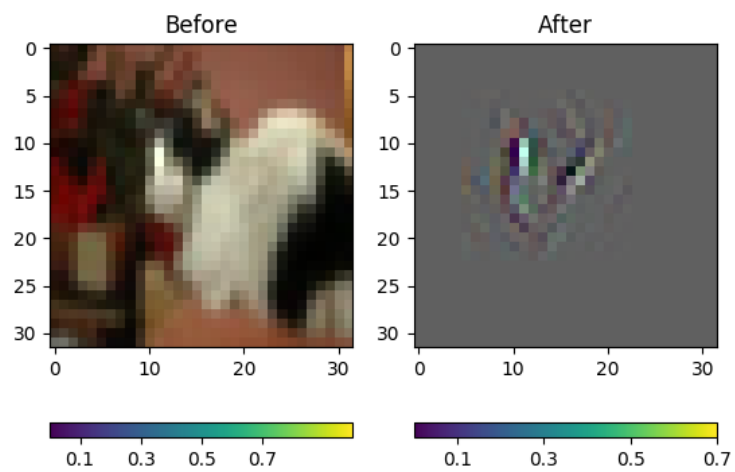Figure 22: Front part of the car along with tyres and front chassis

Cats

Figure 23: Face of the cat, especially the outline of the head