Assignment 3

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Task 1:

Original Image

SLIC Superpixels

Skimage SLIC Superpixels

Using the skimage SLIC is more straightforward to use and requires fewer lines of code. Moreover, as one can see from the result, the skimage library is likely to be more optimized for performance.

However, it is less flexible when it comes to customizing the code. When precise adjustments are needed, it is hard to modify the code.

Using Custom SLIC is good that one can understand the mechanism of SLIC superpixel and can be modified easily.

But also it may not perform well as optimized code unless doing careful optimization. It is apparant that the skimage SLIC performs great but custom one does not. The coder has to try out different values for parameters such as K and m, which is time consuming.

Task 2:

The model predicted **fox_squirrel** with the highest confidence (0.77064), so I would choose this model for simplicity. The below picture is the original picture used for Demo 1 and Demo 2.
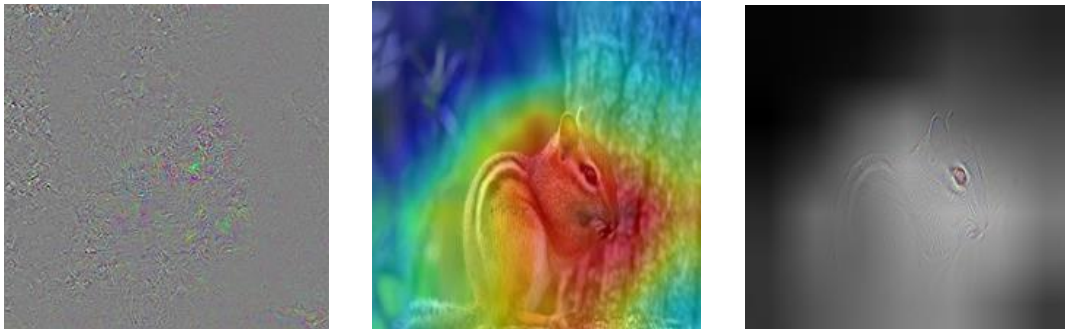

Vanilla Backpropagation:

#0: fox_squirrel (0.72405)

#0: hare (0.06068)

#0: brambling (0.03752)
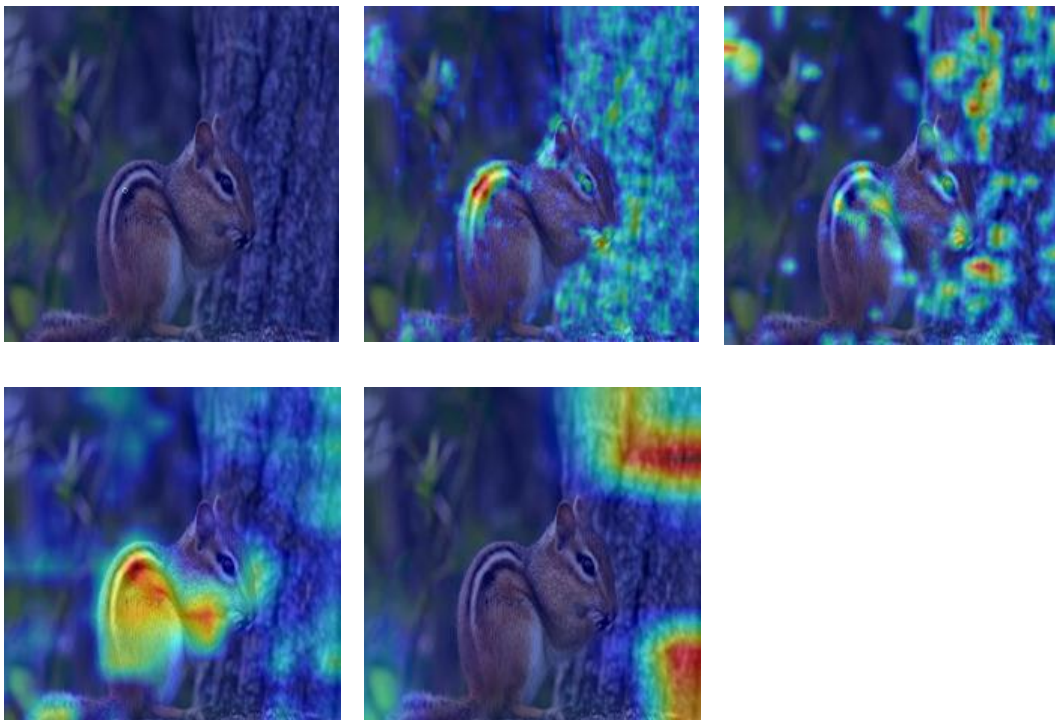
Demo 1 results:

The above pictures show the results of Vanilla backpropagation, Grad-CAM, Guided Grad-CAM respectively.

For Vanilla backpropagation image, it shows the raw pixel influence on the model's output for classifying a fox squirrel.

For Grad-CAM image, it highlights areas in the image most influential for the model's prediction of a fox squirrel.

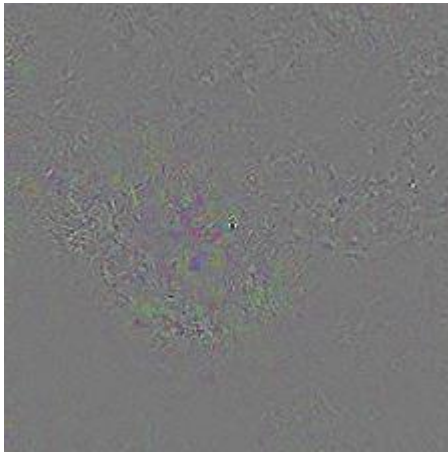For Guided Grad-CAM image, it shows detailed regions of interest for the fox squirrel classification.
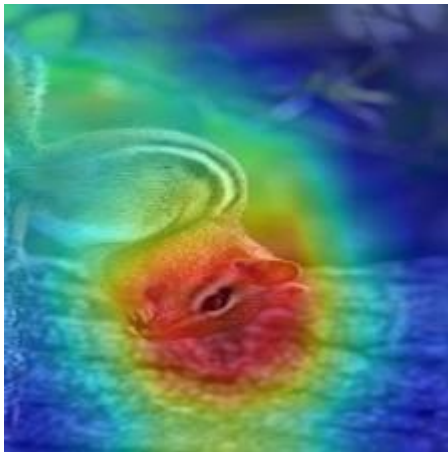
Demo 2 results:

The above is the result of relu, layer1, layer2, layer3, layer4 respectively.

Now I will rotate this image to see whether it performs well in the rotated picture as well.

Rotated Demo 1 results:

Vanilla backpropagation
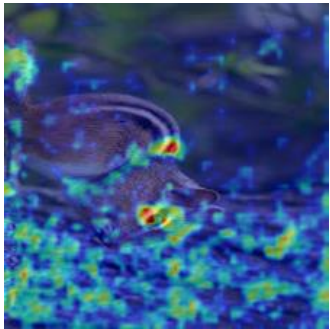

Grad-CAM

Guided Grad-CAM

According to the results above, even the image is rotated, the attention maps seem to be accurate.

Rotated Demo 2 results:

Relu

Layer1

Layer2

Layer3

layer 4
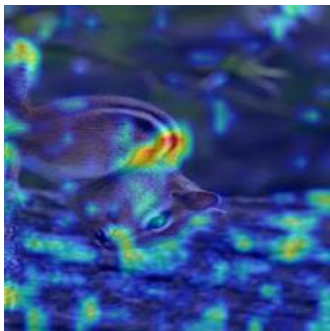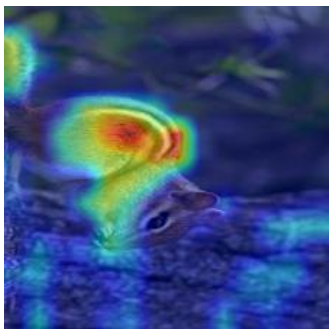
According to the results of Demo 2, it seems that even though the image is modified, attention maps seem to be accurate.