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Explanable Machine Learning

Exercise 2

The source code of the programming exercises and result files should be submitted via eCampus. Answers to theoretical questions can be written in a separate file or directly as comments in the source code. **please submit before 23.11.2023** If you have any questions, don't hesitate to contact me by email (aemam@uni-bonn.de) or in person (Nussallee 15, Room 0.013). You can also contact Prof. Dr. R. Roscher at any time (ribana.roscher@uni-bonn.de).

1   Feature map Visualization

Feature map visualization allows us to visualize the output of the layer that we want to investigate inside an artificial neural network; by looking at these feature maps, we can understand the behavior of the model locally at this point .
please implement the following steps in Python

1. Load a pre-trained resnet50 classifier network

2. Preprocess any image from the categories of Imagenet1k Dataset, for example (Egyptian cat, Tiger, and Lion) . The same preprocessing steps are done to the training dataset of the pre-trained model.
Hint: use [ResNet50-Weights.DEFAULT and weights.transform()]

3. Turn the model into evaluation mode

4. Feed the model with, and check if they are classified correctly

5. Display the layers (nodes) of your model hint: you can use [get graph node names(model)]

6. Get the feature maps (activations) of 3 layers in your model varying in depth, for example. (layer 1, layer 2, layer 4), and visualize a heat map of a channel inside each layer. Hint: use ['get-graph-node-names', or register a forward hook]

7. Describe the change in behavior of the filters going deeper in the network; what are the main focus of shallow layers and deeper layers?