

Debugging a CNN with Hooks

Debugging a CNN with Hooks

Hooks

- power debugging / inspection tool
- understand what happens inside your neural network
- allows to run custom code during forward/backward pass
- function that can be attached to a tensor, module, or network
- every time pass is performed, hook is executed

Forward Hook

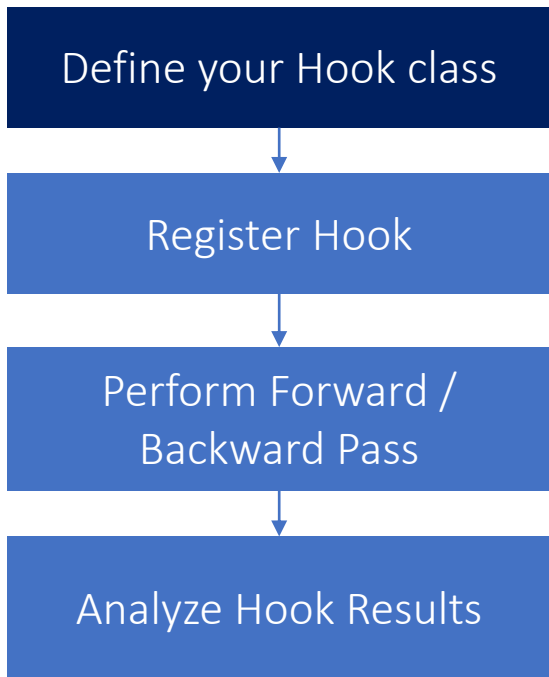
executed during forward pass

Backward Hook

executed during backward pass

Debugging a CNN with Hooks

Hook Implementation

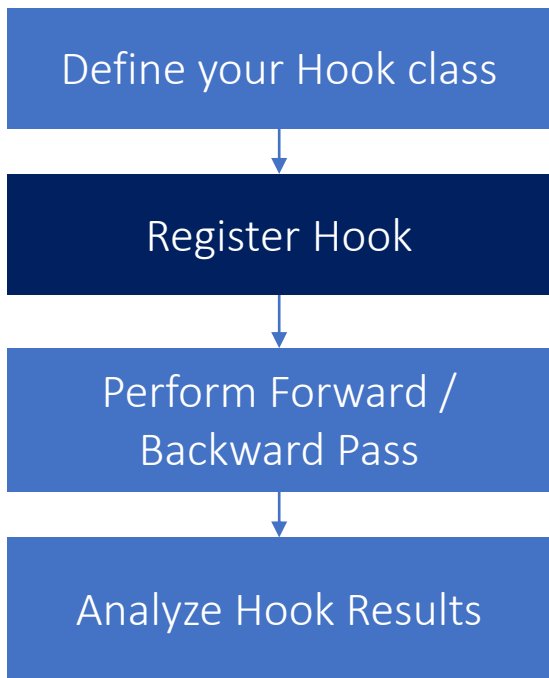


```
%% Hook
class MyHook:
    def __init__(self) -> None:
        # save layer output
        self.layer_out = []
        # save layer shape
        self.layer_shape = []

    def __call__(self, module, module_in,
                module_out):
        self.layer_out.append(module_out)
        self.layer_shape.append(module_out.shape)
```

Debugging a CNN with Hooks

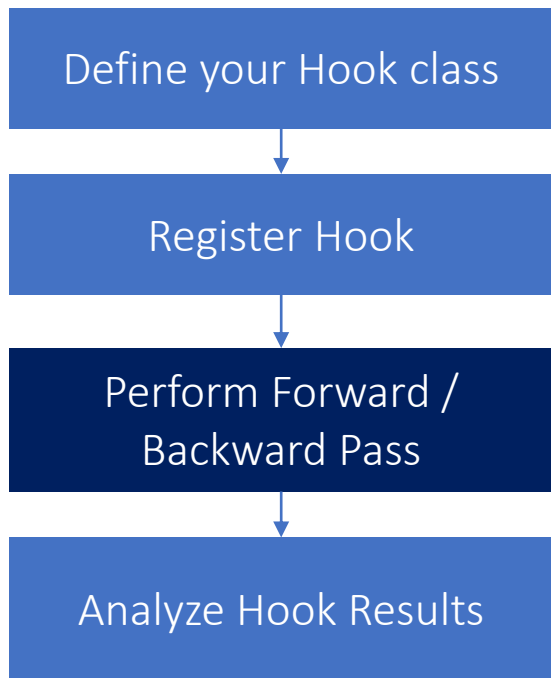
Hook Implementation



```
# Register Hook
my_hook = MyHook()
for l in model.modules():
    if isinstance(l, torch.nn.modules.conv.Conv2d):
        handle = l.register_forward_hook(my_hook)
```

Debugging a CNN with Hooks

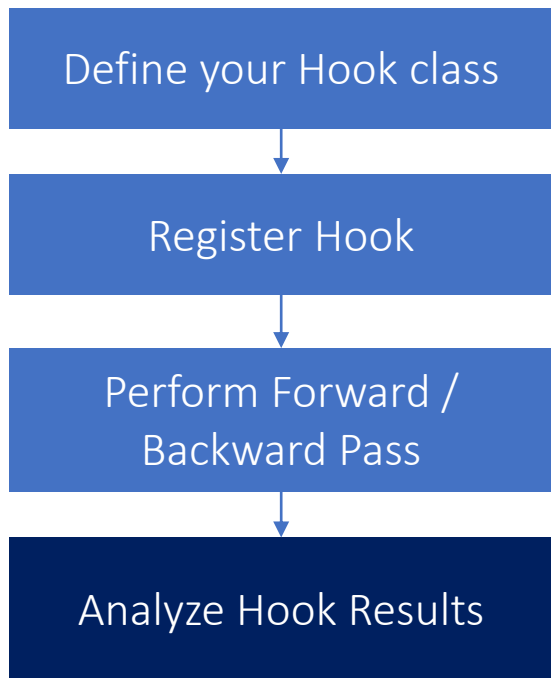
Hook Implementation



```
# %% Forward Pass  
y_pred = model(X)
```

Debugging a CNN with Hooks

Hook Implementation



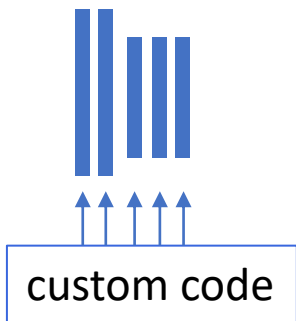
```
layer_num = 0  
layer_imgs = my_hook.layer_out[layer_num].detach().  
numpy()
```

Debugging a CNN with Hooks

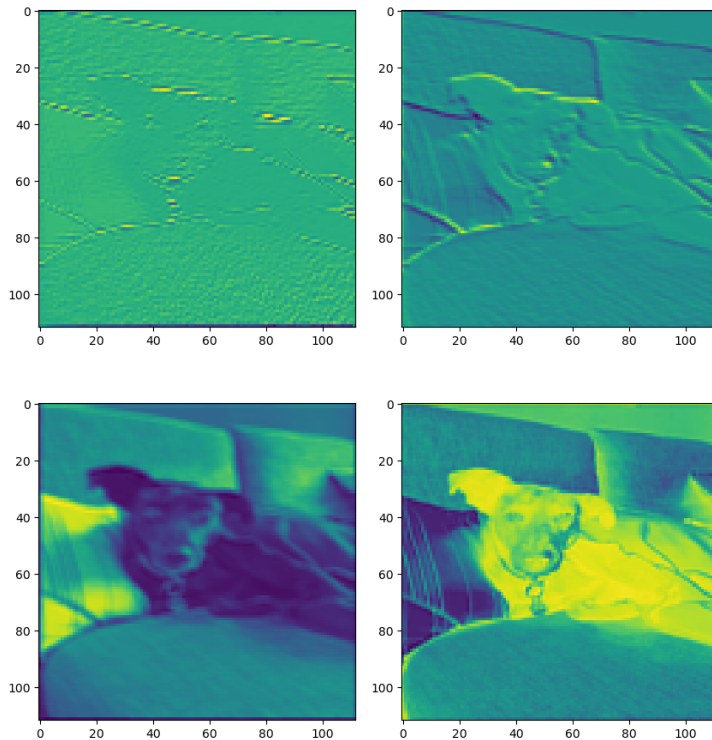
Hook Coding



Resnet18



Layer Outputs



Layer Shape

```
my_hook.layer_shape
✓ 0.0s

[torch.Size([1, 64, 112, 112]),
 torch.Size([1, 64, 56, 56]),
 torch.Size([1, 64, 56, 56]),
 torch.Size([1, 64, 56, 56]),
 torch.Size([1, 64, 56, 56]),
 torch.Size([1, 128, 28, 28]),
 torch.Size([1, 128, 28, 28]),
 torch.Size([1, 128, 28, 28]),
 torch.Size([1, 128, 28, 28]),
 torch.Size([1, 128, 28, 28]),
 torch.Size([1, 128, 28, 28]),
 torch.Size([1, 256, 14, 14]),
 torch.Size([1, 256, 14, 14]),
 torch.Size([1, 256, 14, 14]),
 torch.Size([1, 256, 14, 14]),
 torch.Size([1, 256, 14, 14]),
 torch.Size([1, 256, 14, 14]),
 torch.Size([1, 512, 7, 7]),
 torch.Size([1, 512, 7, 7]),
 torch.Size([1, 512, 7, 7]),
 torch.Size([1, 512, 7, 7]),
 torch.Size([1, 512, 7, 7])]
```