Debugging a CNN with Hooks

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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

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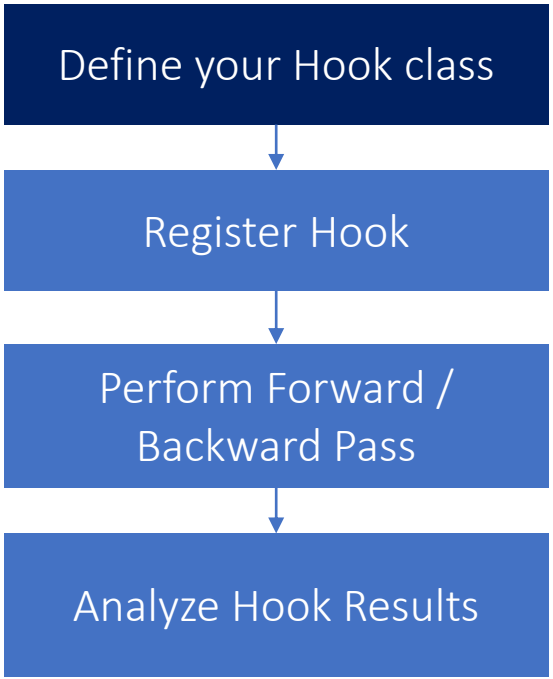
Hook Implementation




```python
#%% 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)
```

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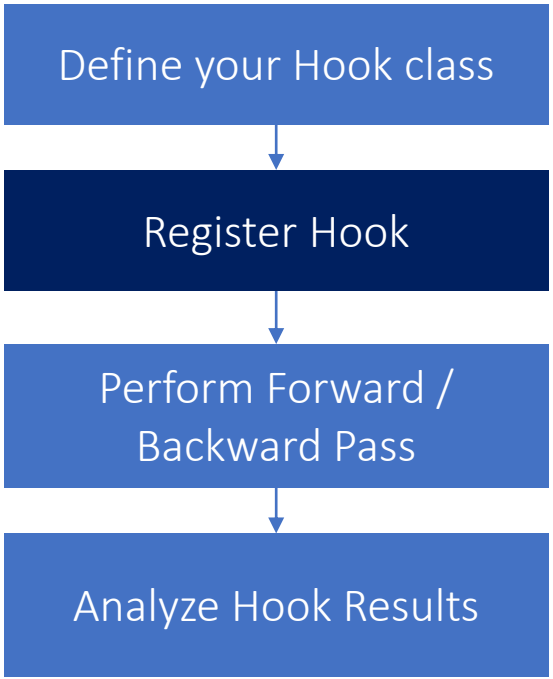
Hook Implementation




```
# 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)
```

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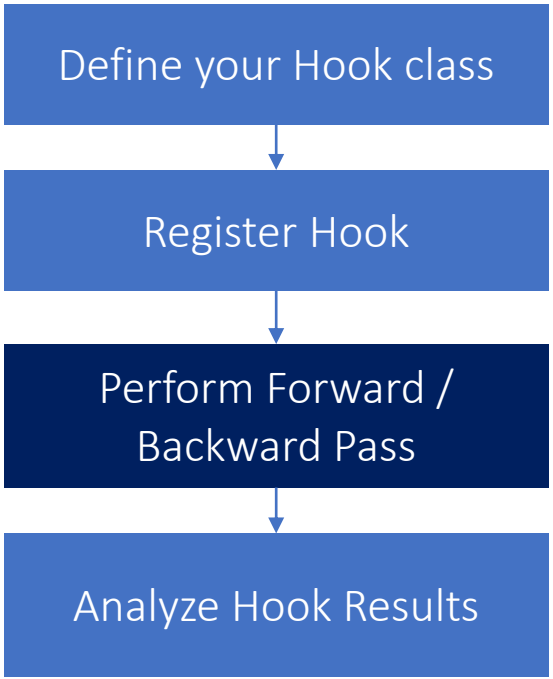
Hook Implementation




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

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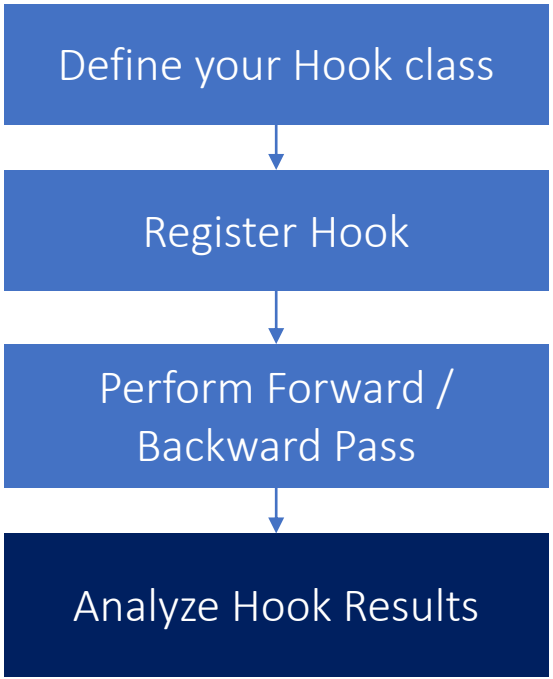
Hook Implementation




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

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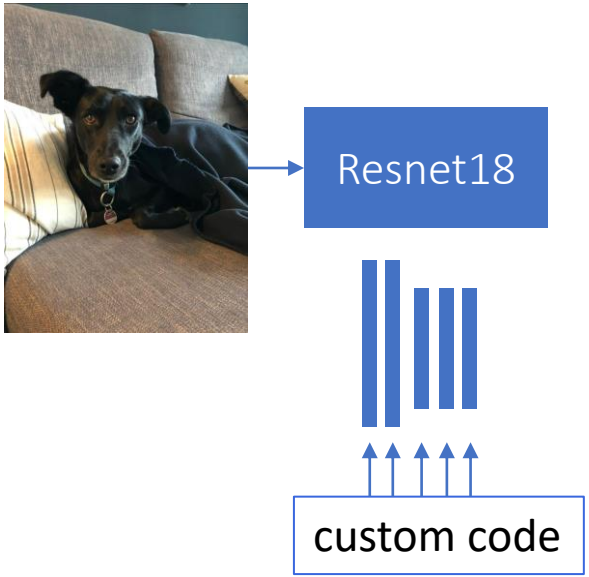
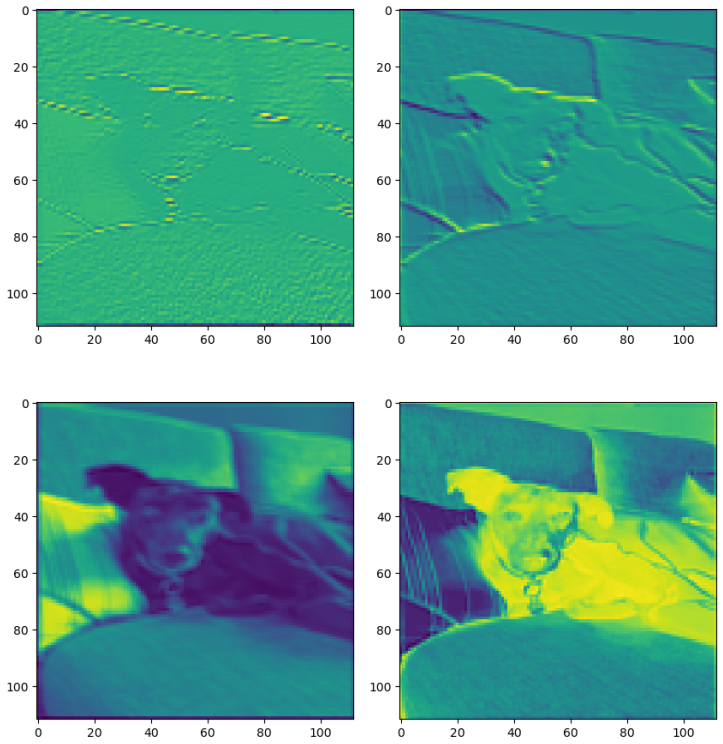
Hook Coding



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, 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])]
```