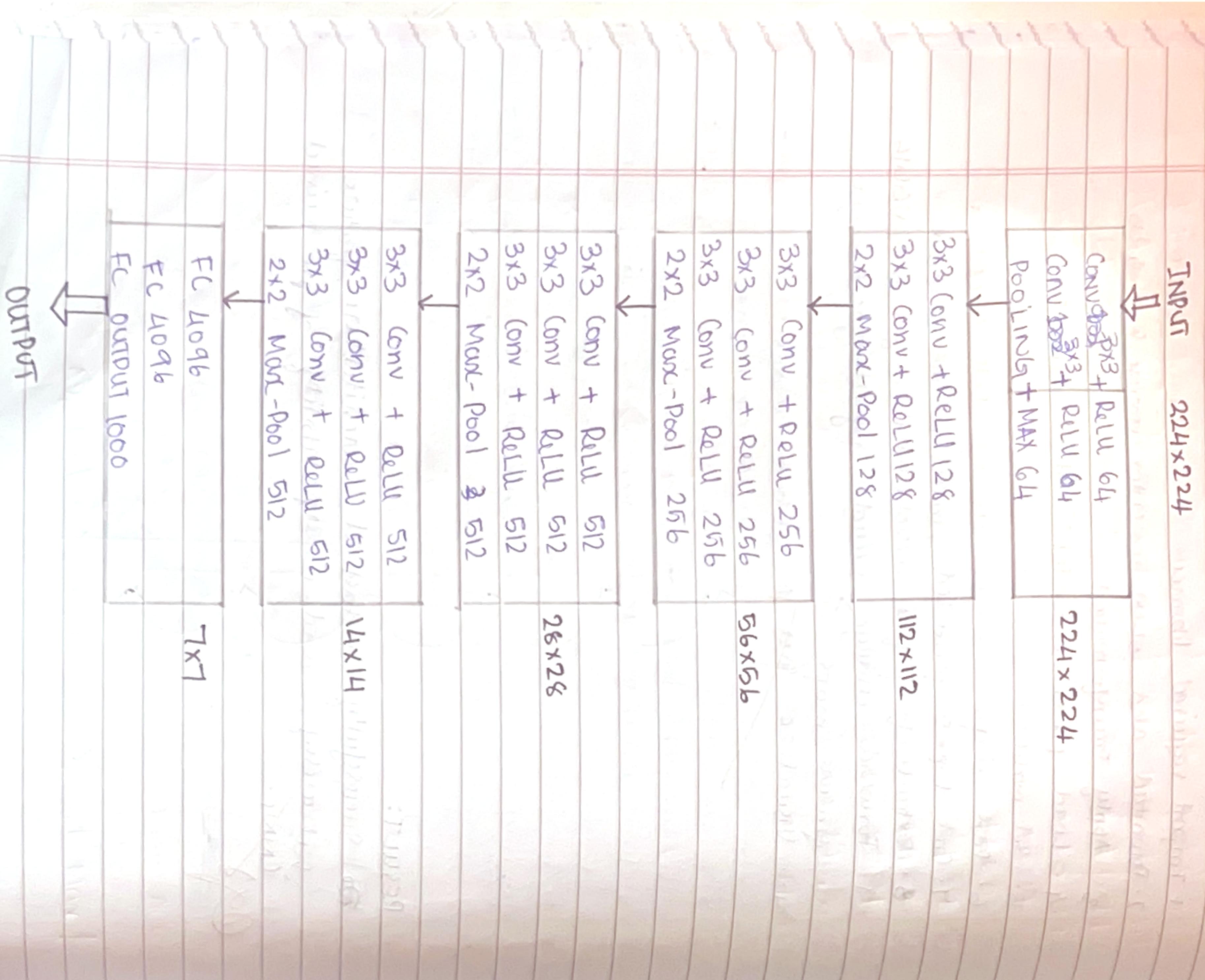


VGG16 ARCHITECTURE :



~~27/10/25~~

LAB-14

Implement a pre-trained CNN model using a Feature Extractor using Transfer learning Model.

AIM:

To implement a pre-trained CNN model [ResNet 18 and VGG16] as a feature extractors using transfer learning. To visualize this performance through training and validation accuracy graph.

OBJECTIVES:

1. To understand the concept of transfer learning and feature extraction
2. To implement pre-trained CNN models such as VGG16 and ResNet 18.
3. To fine-tune the model on a sample dataset CIFAR 10
4. To plot training and validation accuracy / loss curves for comparison.
5. To observe how pre-trained models improve convergence and accuracy.

PSEUDOCODE:

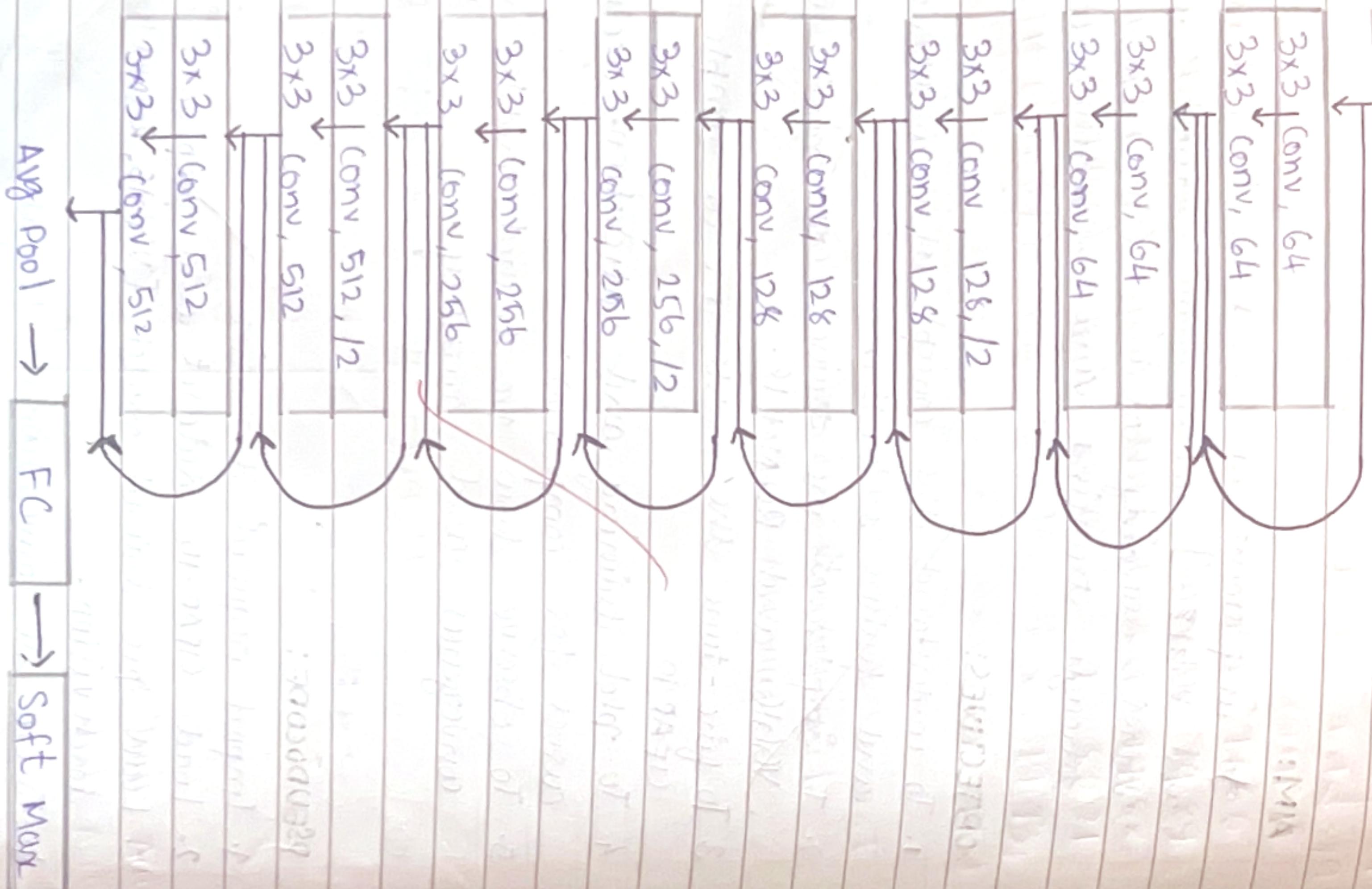
1. Import required libraries.
2. Load CIFAR-10 dataset and preprocess image
3. Load pre-trained models (VGG16, ResNet 18) from torchvision.
4. Freeze all convolutional layers.

ResNet-18 Architecture :-

Maier, Michael. Die Handlung

Input

Wetland indicator species



5. Replace classifier with new layers for CIFAR-10 classes.
6. Train models and record accuracy.
7. Validate performance on test data.
8. Plot accuracy graphs.

\Rightarrow Transfer Learning: use a model pre-trained on a large dataset as the starting point for a new task. The idea is to reuse learned features instead of training from scratch, saving both time and computation.

\Rightarrow Feature Extraction: the convolutional base of a pre-trained model is frozen and only one final classifier (layer) was trained for the new task.

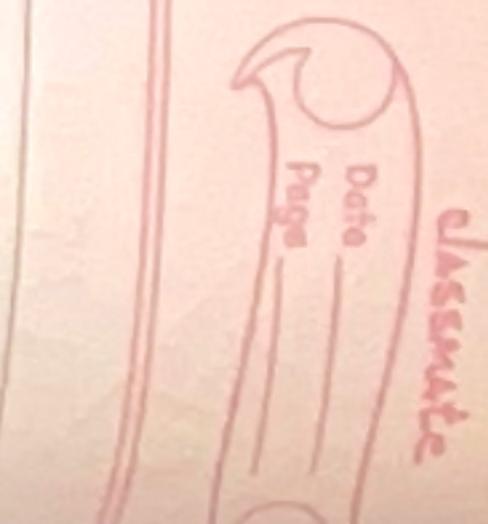
- Developed by Visual Geometry Group, Oxford
- Contains 16 layers (13 convolutional + 3 fully connected)
- Uses small 3×3 filters for better feature granularity.
- Simple, deep but computationally expensive.

=> ResNet 18:

- Introduces ~~residual~~ skip connections to overcome vanishing gradient.
- Allows efficient training of every deep network.
- Light and faster than VGG with better accuracy.

OUTPUT:

VGG16 Epoch (1/5)	Train Acc : 72.50	Test : 78.23
VGG16 Epoch (2/5)	Train Acc : 74.80	Test : 78.09
VGG16 Epoch (3/5)	Train Acc : 75.39	Test : 79.95
VGG16 Epoch (4/5)	Train Acc : 75.84	Test : 79.37
VGG16 Epoch (5/5)	Train Acc : 75.74	Test : 79.94



ResNet18 Epoch (1/5) Train : 73.23 Test : 77.60

ResNet18 Epoch (2/5) Train : 76.77 Test : 79.89

ResNet18 Epoch (3/5) Train : 79.55 Test : 79.88

ResNet18 Epoch (4/5) Train : 80.08 Test : 80.21

ResNet18 Epoch (5/5) Train : 80.16 Test : 79.73

OBSERVATION:

- > VGG16 : Deep, slower to converge
- > ResNet18 : Faster, more efficient with skip connections
- > ResNet achieved higher accuracy and faster convergence.
- > Accuracy curves shows smoother training stability for ResNet18.

FINISH

RESULT:

Successfully implemented a pre-trained CNN model as a feature extraction using transfer learning

and visualized this performance

~~NOT~~

RESULTS

