



# Transfer learning

MobilNet, AlexNet, VGG16,  
ResNet50

By:

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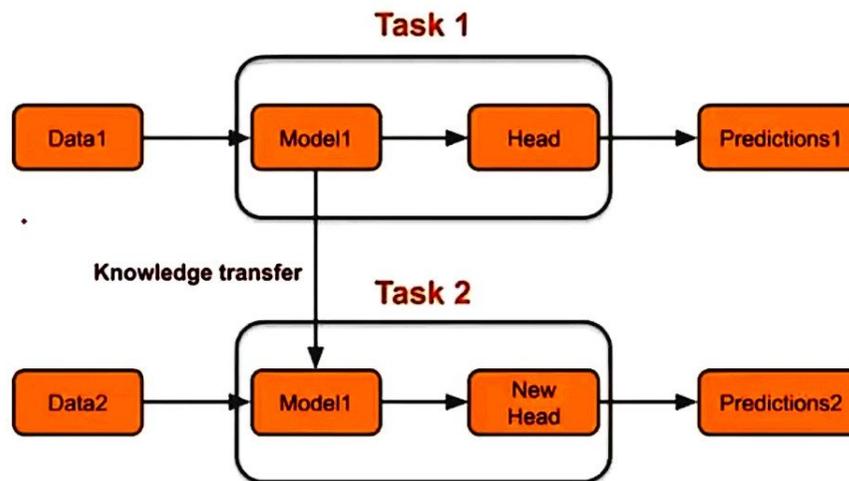
## Transfer Learning

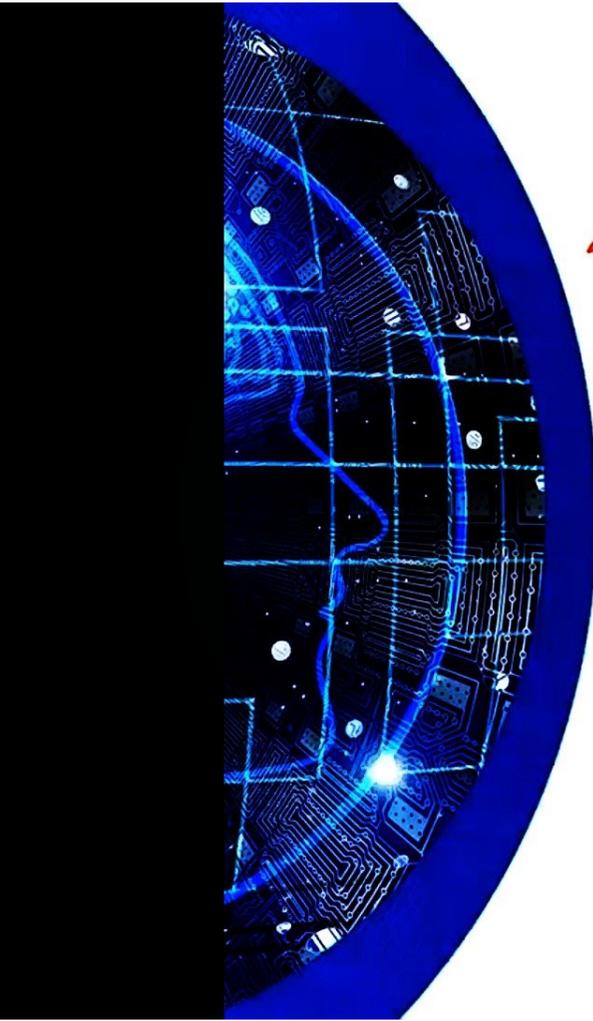
- Transfer learning is a **machine learning method where a model developed for a task is reused** as the starting point for a model on a second task.
- Common examples of transfer learning in deep learning. When to use transfer learning on your own predictive modeling problems



# Illustration

## Transfer Learning





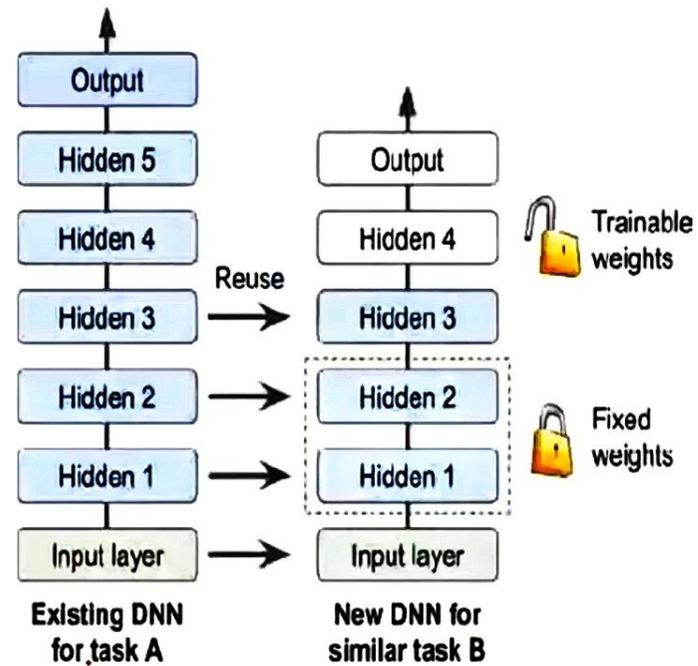
## Reusing Pretrained Layers

- It is generally not a good idea to train a very large DNN from scratch.
- Try to find an existing neural network that accomplishes **a similar task**.
- Reuse the lower layers of this network.
- This is called ***transfer learning***.



## Example

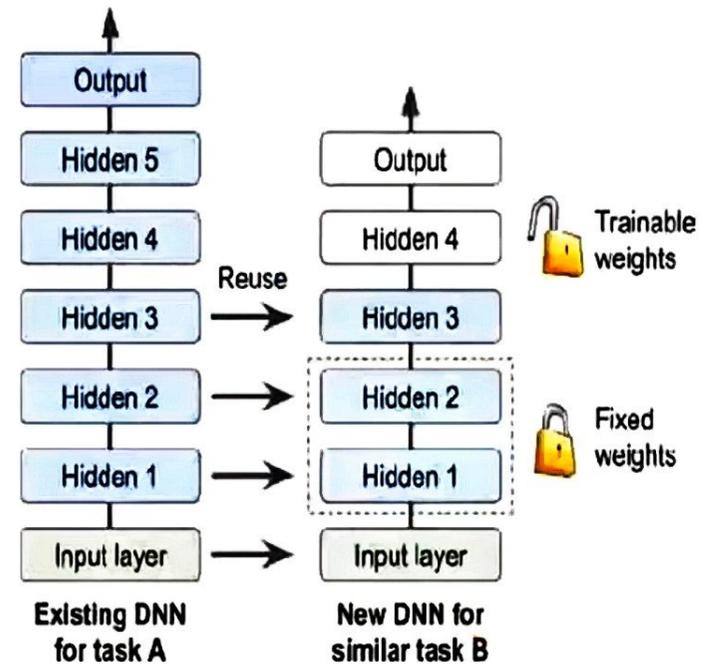
- DNN that was trained to classify pictures into **100** different categories.
- You now want to train a DNN to classify specific types of vehicles.
- **Freezing** the Lower Layers weights.
- **Tweaking, Dropping, or Replacing** the Upper Layers.





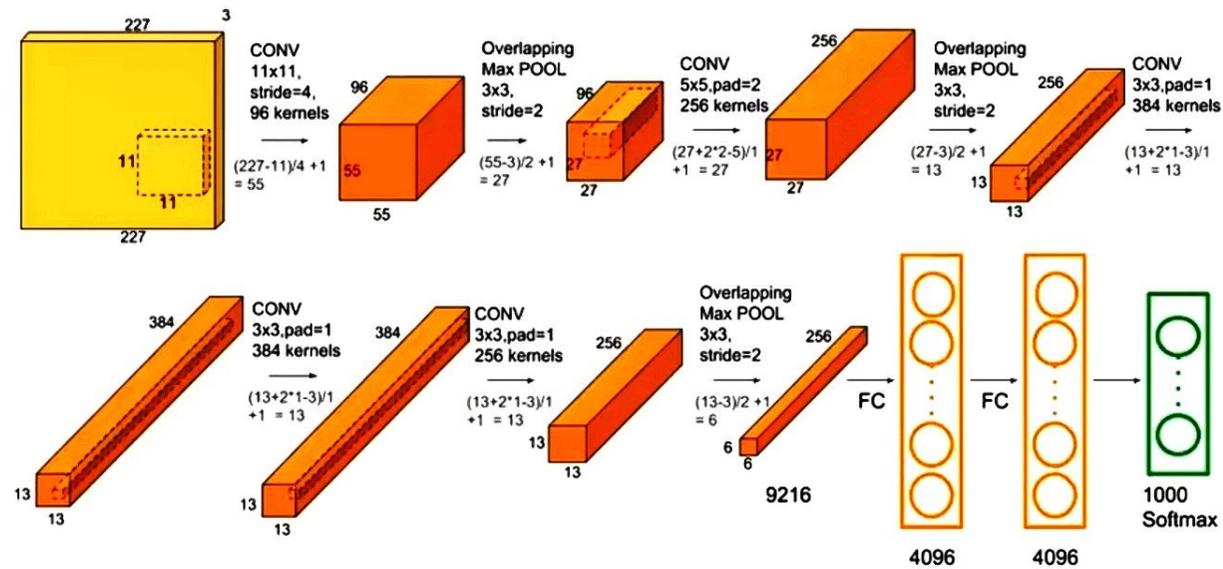
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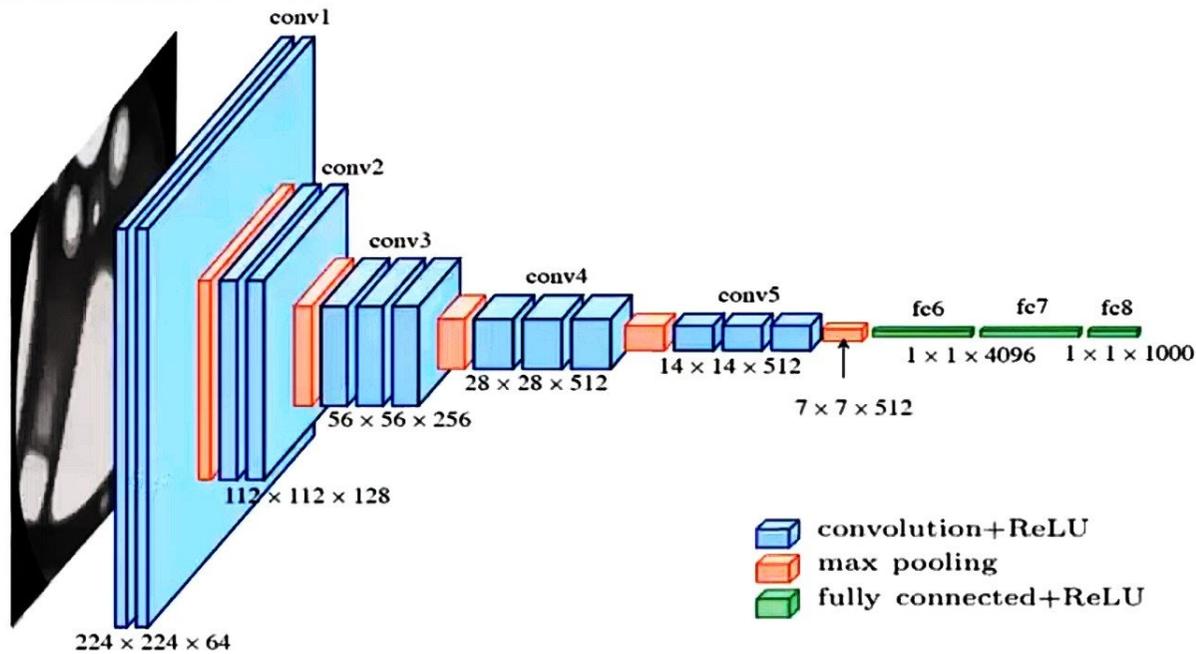
# Understanding AlexNet

*image class*



Consists of 5 Convolutional Layers and 3 Fully Connected Layers (classify 1000 classes)

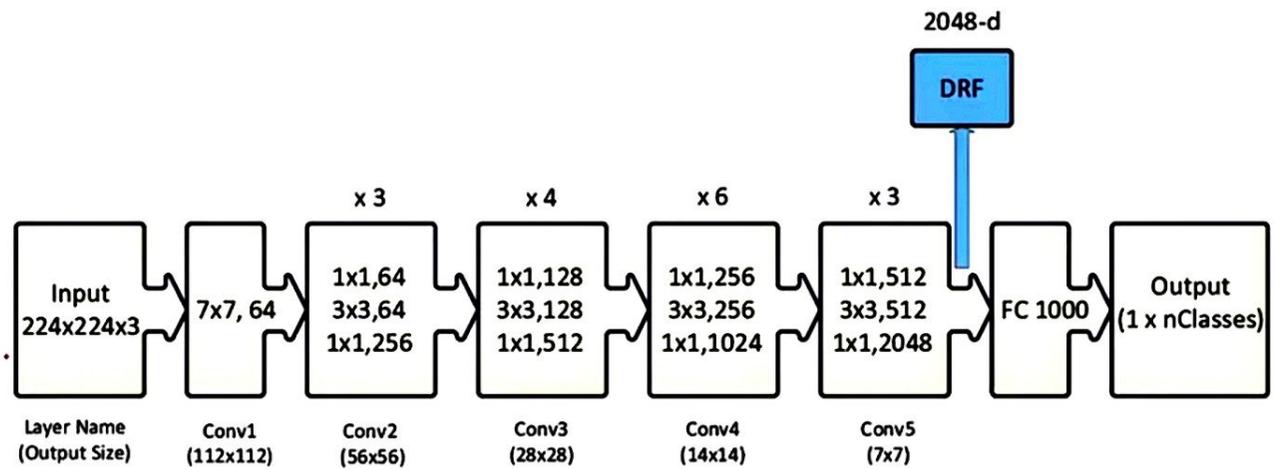
# VGG Model



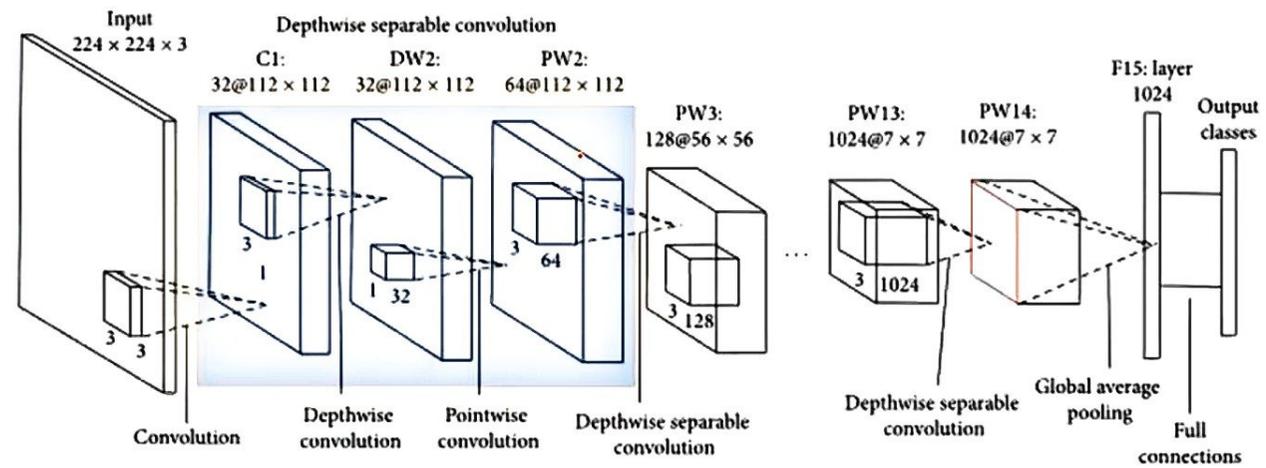
VGG16

VGG19

# ResNet50



# Mobile Net



# + Transfer Learning



1. Train on Imagenet



2. Small dataset: feature extractor

Freeze these

Train this



3. Medium dataset: finetuning

more data = retrain more of the network (or all of it)

Freeze these

Train this

## + How Transfer Learning Works

- In neural networks dealing with images, usually try to **detect edges in the earlier layers**, **shapes in the middle layer** and **some task-specific features in the later layers**.
- In **transfer learning**, the early and middle layers are used, and we only **retrain** the **task-specific layers**. It helps influence the labeled data of the task it was initially trained on.
  - The **task 1** and **task 2** must have the **same setting** for input.

# Example

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