Transfer Learning

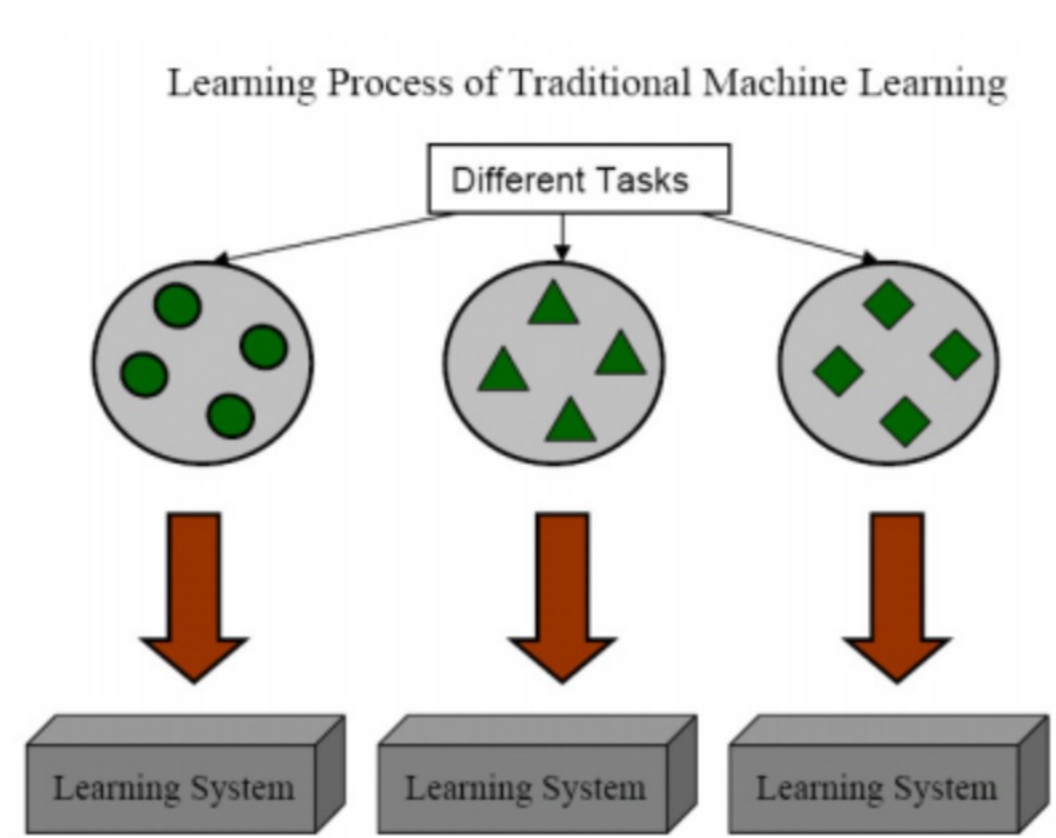
Transferring the knowledge of one model to perform a new task.

"Domain Adaptation"

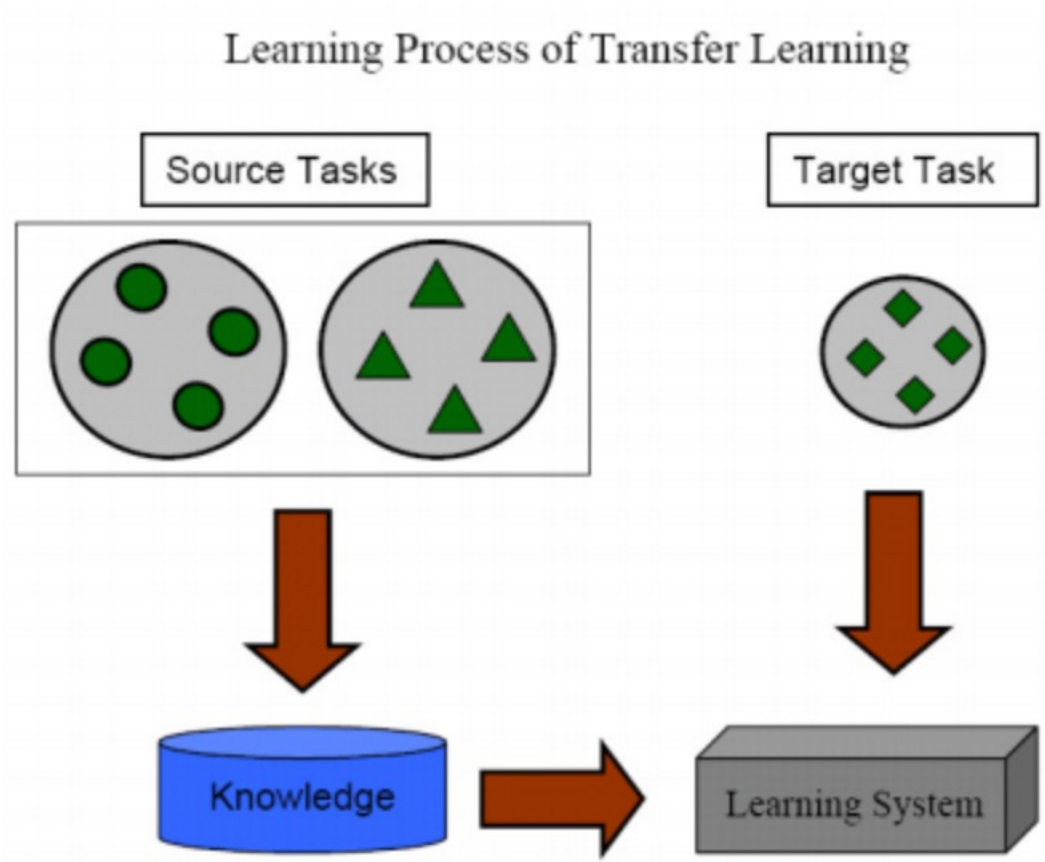
Motivation

- Lots of data, time, resources needed to train and tune a neural network from scratch - An ImageNet deep neural net can take weeks to train from scratch.
- Insufficient labelled data for a particular task.

- Solution: Use already trained neural network on a similar dataset - exploiting the generalization properties (Cheaper, faster way).



(a) Traditional Machine Learning



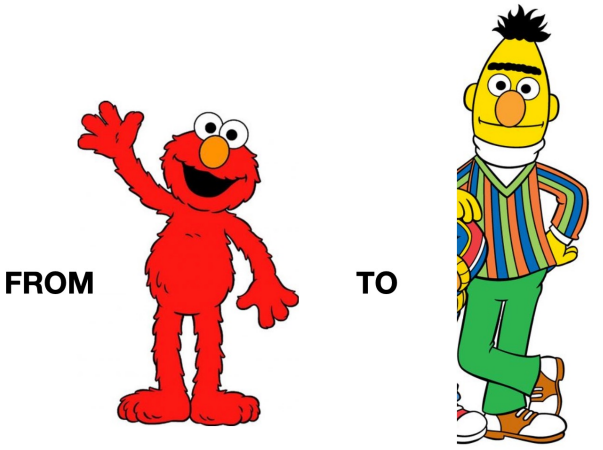
(b) Transfer Learning

Transfer Learning

- In our context: Take a network trained on a task for which it is easy to generate labels and adapt it to a different task for which it is harder.
- In computer vision: train a CNN on ImageNet, transfer its representations to every other CV task
- In NLP: train a big language model on billions of words, transfer to every NLP task!

Process

- Start with pre-trained network
- Partition network into:
  - Featurizers: identify which layers to keep
  - Classifiers: identify which layers to replace
- Re-train classifier layers with new data
- Fine-tune whole network with smaller learning rate.



Resources

- https://arxiv.org/abs/1911.02685