TRANSFER LEARNING

Artificial Intelligence

By Luck S. Shrestha

“After supervised learning — Transfer Learning will be the next driver of ML commercial success.”

Andrew Ng

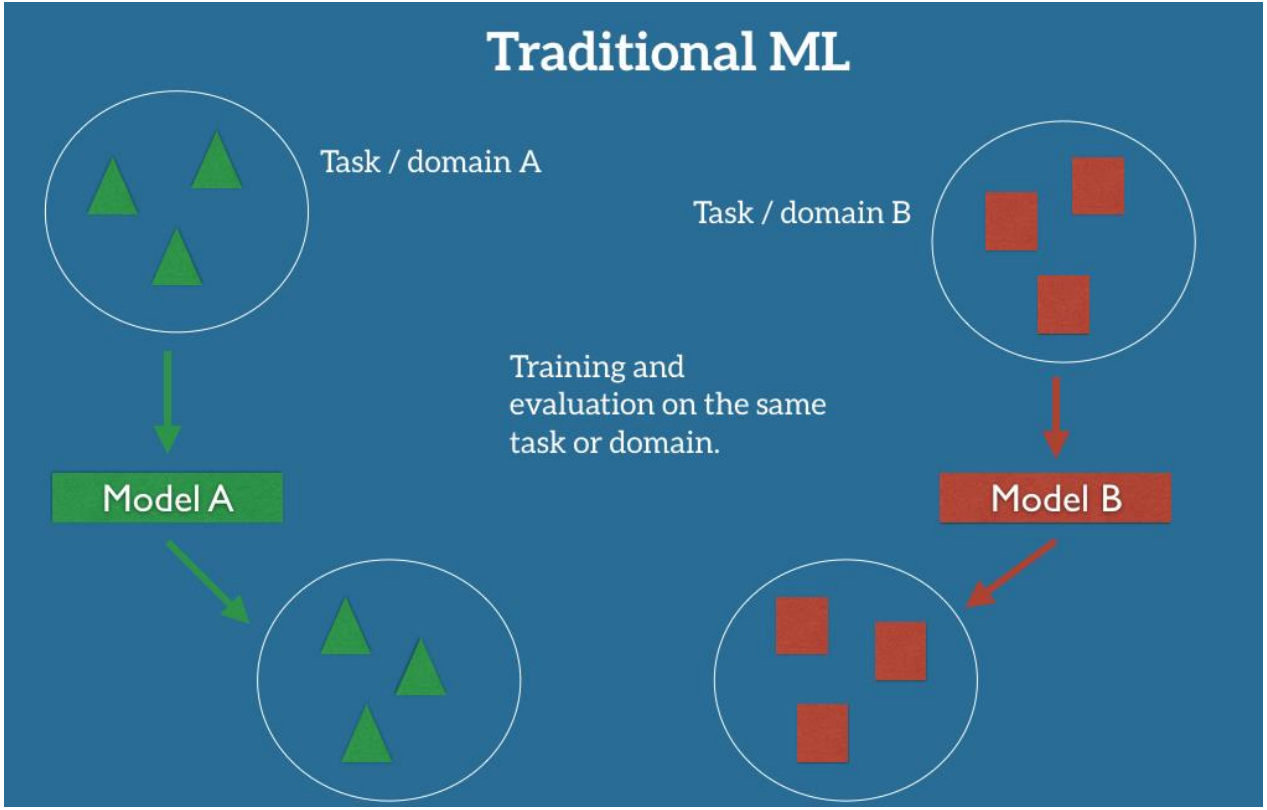
Definition

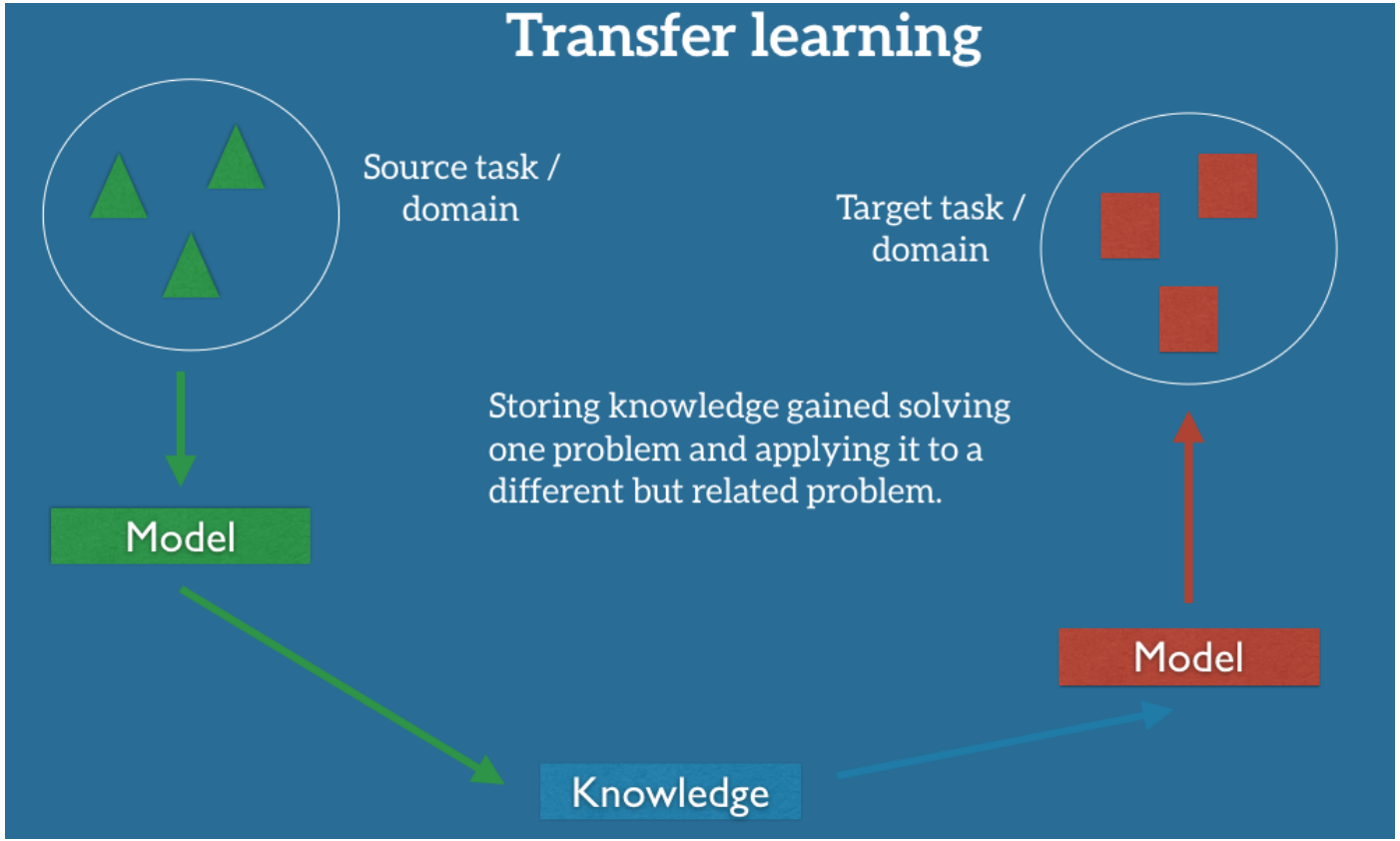
Transfer learning is a research problem in machine learning that focuses on storing knowledge gained while solving one problem and applying it to a different but related problem.

The ability of a system to recognize and apply knowledge and skills learned in previous domains/tasks to novel tasks/domains, which share some commonality.

Why Transfer Learning?

- Why start from scratch?
- Traditional supervised learning paradigm breaks down when we do not have sufficient labeled data for the task or domain we care about.
- Goes beyond specific task or domain.
- Use knowledge from pretrained models.


Traditional ML
Task / domain A
Task / domain B
Training and
evaluation on the same
task or domain.
Model A
Model B


Transfer learning
Source task / domain
Target task / domain
Storing knowledge gained solving one problem and applying it to a different but related problem.
Model
Model
Knowledge

Applications

- Real-world Simulation
- Text Classification
- Image Classification
- Reinforcement Learning
- Sentiment Classification
- Collaborative Filtering
- Gaming

How to apply?

- As a classifier
- As a standalone feature extractor
- As an integrated feature extractor
- For weight initialization

Examples

IMDB movie reviews sentiment Analysis

https://colab.research.google.com/drive/1XlOPVdoTW_ePY_vujaiwID3zfsh1mSne?usp=sharing

Dog vs Cat Image Classification

https://www.kaggle.com/bulentsiyah/dogs-vs-cats-classification-vgg16-fine-tuning

References

- https://ruder.io/transfer-learning/
- https://en.wikipedia.org/wiki/Transfer_learning
- http://www.intsci.ac.cn/users/zhuangfuzhen/TransferApplication.pdf
- https://www.manning.com/books/deep-learning-with-python
- https://nlp.stanford.edu/projects/glove/
- https://neurohive.io/en/popular-networks/vgg16/