

Transfer Learning

Leveraging pretrained models and adapting them to your problem

Roberto Souza
Assistant Professor
Electrical and Computer Engineering
Schulich School of Engineering

February 2021

Outline

- Learning Goals
- Idea Behind Transfer Learning
- Step-by-step transfer learning procedure
- Summary

Learning Goals

- Understand the motivation behind transfer learning approaches
- Understand the general transfer learning procedure

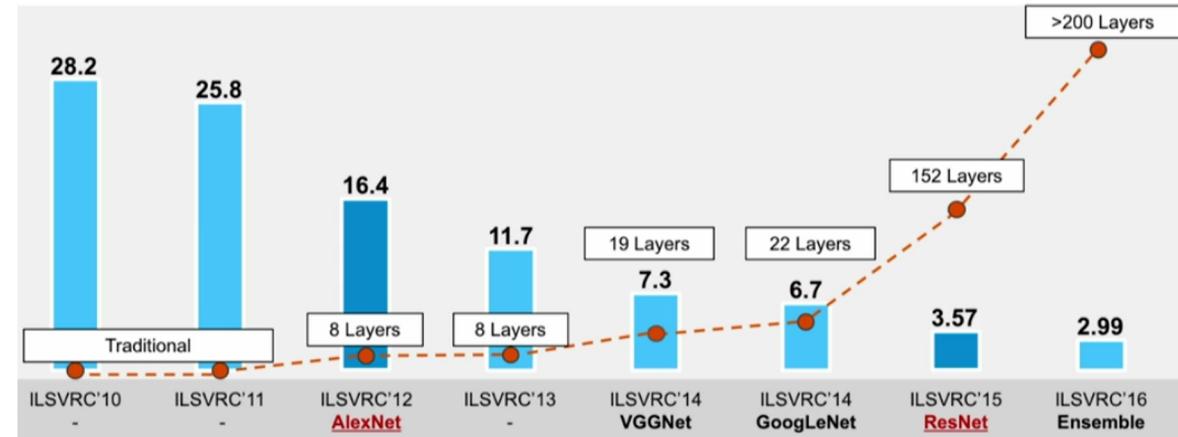
Transfer Learning

- **Transfer learning** is the process of adapting a representation learned while solving one problem and adapting this representation to a different but related problem.
- It is very useful when you do not have large amounts of data to train your model from scratch.
- This Keras tutorial is highly recommended: https://keras.io/guides/transfer_learning/

ImageNet Challenge



- ImageNet is a large scale object classification challenge
- >14,000,000 annotated images
- >20,000 classes



- In 2012 teams started using graphics processing units (GPUs)

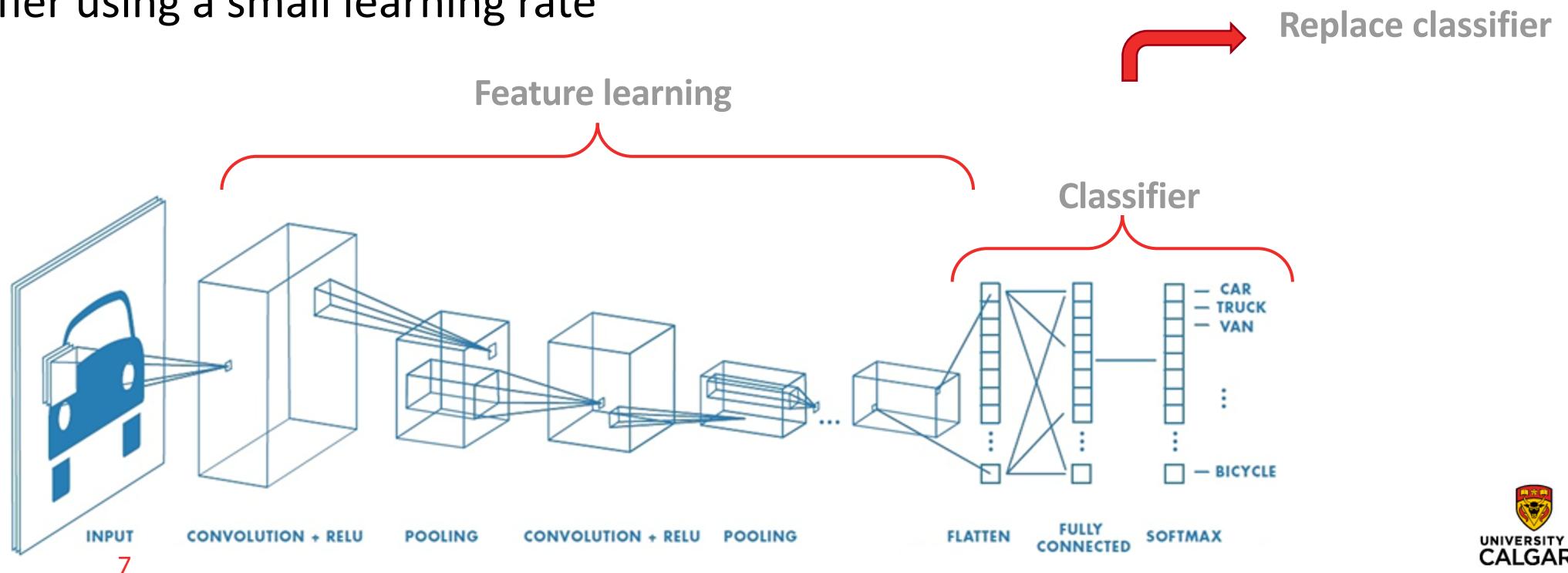
Transfer Learning Intuition



Lasagna or endocarditis?

Transfer Learning

- Use a model pre-trained for a different task and:
 - Freeze the feature learning layers and re-train the classifier on new data
 - Then, unfreeze the feature learning layers and retrain them along with the classifier using a small learning rate



Summary

- Transfer learning is a powerful technique for situations where your dataset has too little data to train a full-scale model from scratch
- It relies on the assumption that the representation that you learned for one problem will be useful for a separate but related problem

Thank you!



UNIVERSITY OF
CALGARY

